POULTRY FARMING
FOR BEGINNERS

J. W. HURST

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BY

J. W. HURST

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"EGG PRODUCTION," "SUCCESSFUL POULTRY PRODUCTION,"
"SUCCESSFUL INCUBATION AND BROODING,"
"SUSSEX FOWLS," ETC., ETC.

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FOREWORDS

> "Whether it is a wise or a foolish thing to do, a great many people are starting poultry farming, and if you can put them on the best lines you will be doing more good than by commenting on the theoretical rubbish which is being promulgated by so many so-called experts."

THE above extract from a letter received from a London editor will serve both as a text and as a brief indication of the intention and scope of this book.

At no previous period has there been such urgent necessity for greatly increasing the output of eggs and table poultry, or so strong an inducement to take full advantage of the opportunities naturally afforded English poultry-keepers. It is also true that never before has the subject aroused such general and serious attention. The difficulties of supply have led many to contemplate the keeping of a few fowls for their own household purposes, whilst various schemes are being put forward for the employment of disabled soldiers and sailors in rural occupations, poultry farming being commonly given a prominent position among the possibilities.

Since the commencement of the war the many suggestions that have been made with regard to the development of the poultry industry within the United Kingdom have for the most part been dictated by patriotism and a desire to increase and maintain the national food-supply, as well as by the wish to provide a means of livelihood or an addition to income for certain sections of the community. Some of the proposals have been admirable, and would, if carried out upon common-sense lines, go far towards effecting the desired objects. Others have been more or less impracticable, or have tended to revive old fallacies and raise false hopes.

Within reasonable limits, as regards individual enterprise, the present prospects are excellent; and if a determined and sufficiently widespread effort is made now, British producers would certainly occupy a very different position in the home markets after the war, as compared with the hitherto very unsatisfactory state of affairs. Great progress has been made during the past decade; methods have been improved very generally, greater attention has been paid to breeding problems, the principles of feeding are better understood, egg production has been developed to a really remarkable extent, a knowledge of the art of fattening is steadily spreading, and appliances for incubation and brooding have assumed a position of commercial and economic importance in the industry.

Poultry-keeping for the production of marketable eggs and poultry is capable of being made a much more profitable undertaking than was once the case, but with all the improvements and experience the occupation cannot —as a general rule—stand alone as a means of making a livelihood. That there are exceptions may be admitted, but they will hardly suffice for general encouragement. The limitations must always be remembered, and I am trying to bear in mind the capabilities and requirements of ordinary individuals.

The proportion of those who enter London with 2s. 6d. and achieve the Mayoralty must be lamentably small, although such prodigies were freely dangled before our youthful imagination. Such examples are apt to be misleading, unless appraised at their true worth relative to general possibilities; and although I may know of similar cases of remarkable success in one branch of poultry farming or another, I am not going to set them forth as an allurement to ordinary beginners. Where one has, in his own sphere, equalled the success of the half-crown Lord Mayor, starting from a relatively unpromising beginning, hundreds have failed who commenced from a much more promising starting-point.

Having eased my conscience to that extent, I hope to point out how poultry farming may be undertaken upon various more or less definite lines, and according to varying degrees of the main object—profit.

J. W. H.

Sussex,
September, 1916.

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POULTRY FARMING FOR BEGINNERS

CHAPTER I

PRELIMINARY CONSIDERATIONS

How to gain experience—Concurrent interests—The holding and the capital—The scope of production.

What is a reasonable scheme of operations, and how is an ordinary novice to set about poultry farming? Well, a novice is one who is new in anything, and it is just that newness that needs to be removed before one starts such an occupation upon a serious business basis. There is a great deal that requires understanding, and understanding thoroughly, before it is wise to risk capital in poultry farming. In short, experience must be gained, and when that is done the novice stage is passed and the personal venture may be made. The first essential, therefore, is the gaining of practical experience. How is it to be done? By indicating one method I do not imply that there are no other means—there are; but they are not equally open to all. It is no use to be squeamish, and the man who wants to learn poultry farming must work, and the *willing* worker has many opportunities of gaining the desired knowledge if he can offer labour worth the having. If not, he must pay something for the privilege of learning. Whilst many have asked me how and where they are to gain experience, I have come across a good many others who have found out for themselves, and I am bound to say that those of the latter class have produced the greater number of subsequent successes. However, it often saves time to ask, and I have no wish to check those who

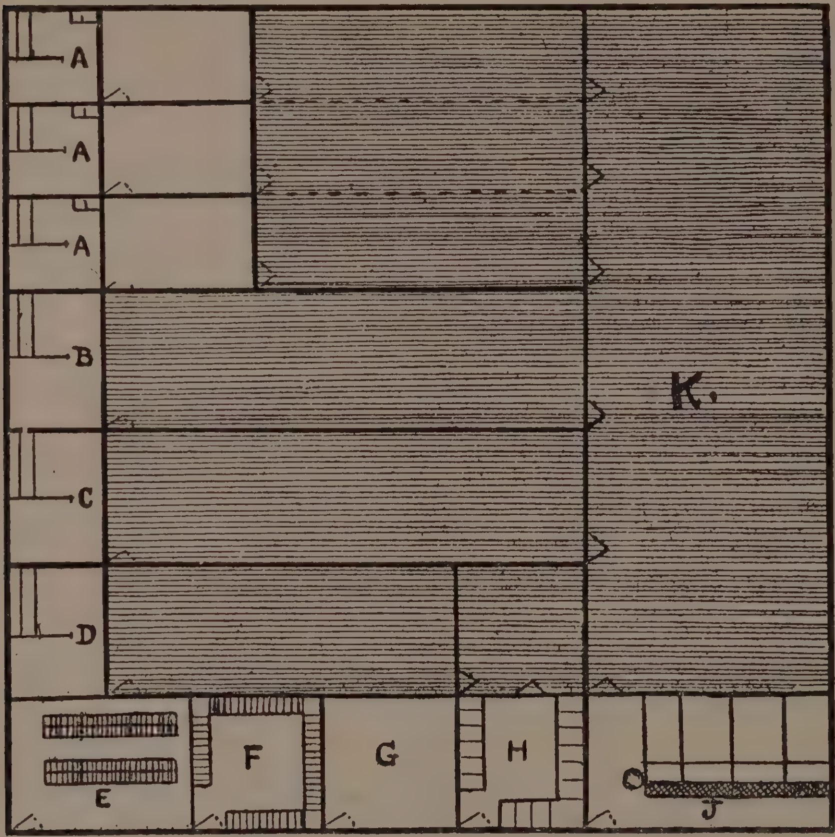


Fig. 1.—Plan of Poultry Pens and Yards.

A, *A*, *A*, Breeding pens, covered gravel pens, and grass runs ; *B* and *C*, cockerel and pullet pens ; *D*, pen for "wasters" to be marketed ; *E*, fattening pens ; *F*, individual pens for training show birds or displaying birds for sale ; *G*, food store ; *H*, incubator room ; *J*, brooding house ; *K*, grass run for chicken rearing.

may have questions to put. The fact that I wish to impress in the first instance is that work of a practical character must be the first consideration, and that—by whatever means are open—this should be undertaken upon a farm, holding, or other place where men are producing poultry for profit—and making it. If I were asked how long the practical work should be continued,

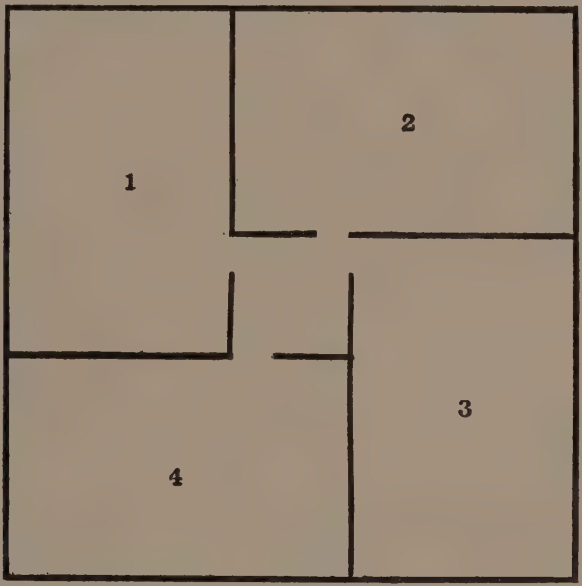


FIG. 2.—PLAN FOR CROPPING AND STOCKING A SMALL AREA OF GROUND, WITH FOWL HOUSES IN CENTRE.

I should say for a year at least. A shorter period cannot include all the seasonable operations that go to make up a poultry farmer's year, and must necessarily be misleading to the extent of the work that is missed. Annual profit cannot be based upon the returns of a portion of the whole period. After the practical training I would recommend a course at one of the leading agricultural colleges, where the subject is made a special one; but on no account would I advise anyone to substitute the one for the other, or to commence with the theoretical training. Moreover, both on the practical and the theoretical side, although poultry may be made the chief subject of work and study, it is by no means all that is necessary—as we shall presently see.

Concurrent Interests.

As I have already said the poultry farmer must have a general workable knowledge of some other subjects, it becomes necessary to make some reference to the most suitable accompanying interests. This is more particularly essential inasmuch as the requirements of the whole enterprise must be fully realized before land is bought or hired. The poultry may be the principal aim, but, as it is not to be the only production, the other uses to which the land is to be put must also be fully considered in advance, a remark which applies more or less fully in proportion to the extent of the proposed undertaking, and its relation to other possible and less similar occupations.

Those who seriously contemplate poultry production as a chief means of livelihood must also consider some other and concurrent remunerative use of the land, if they are to occupy a sufficient acreage to make the poultry profitable to the extent of their desires. Another and particularly suitable and complementary branch of work is that of cow-keeping, and this becomes really essential to economic success in poultry production if fattening is to form any important part of the scheme. As an instance, I may mention the case of one man of my acquaintance, who commenced poultry work with the few fattening coops he could accommodate in a cottage garden, and filled them with the birds he could collect in a back-crate. That he now farms 500 acres is the natural result of the growth of his poultry production, the land being required to utilize the manurial product to the best advantage, and to support the cows to provide milk for fattening; but although he farms to that extent, he remains a fattener, and poultry production is his chief business. In a lesser degree, and apart from this specialized branch, cow-keeping has many advantages as a concurrent occupation for the poultryman, and the nearness to rail or market that is necessary for the one branch is equally essential for the other. Moreover, the poultry producer who also keeps cows, but does not specialize in fattening fowls, will often find that pigs are a more or less remunerative side-line. In addition, it is in some situations worth while to grow market crops, and some amount of fruit will usually be advisable.

There are other possible suggestions, but I think that, within the limits of a small holding, the man who sets out to produce poultry as a main source of income can scarcely do better than combine cow-keeping, and pigs, in suitable circumstances. There are situations in which grazing may be undertaken as a desirable adjunct, but suitable accommodation land at a reasonable rental is not always easy to find. However, the question of concurrent interests must be decided by the individual, who must often be guided by circumstances; and having indicated the necessity for a sufficient knowledge of these other subjects, I may pass on to the more direct considerations of poultry farming. But let it be distinctly understood that I am not contemplating a form of poultry farming that excludes other remunerative uses of the land, rather that I have in view a common-sense method of poultry production which may be made the principal object of such a combined enterprise. The prospects must inevitably depend very largely upon the individual and his capabilities, and (as in any other direction) success or failure may result in practically equal circumstances; but of the possibility of success I am in no doubt — given sufficient experience and capital.

The Holding and the Capital.

The nature and extent of the land necessary for the several requirements will, of course, vary in individual cases ; but following the course already indicated as preferable, a pastoral holding would most nearly meet the needs, one with sufficient arable for roots if the other interests make this desirable. A man may in time develop beyond the limitations of the small holding (exceeding one acre, but not exceeding fifty acres) ; but although experience may show how profitably to exceed the maximum, I would not advise anyone to start who was so inexperienced as to seek the minimum, if thinking of poultry farming as a commercial proposition. Rent is a very important item, and small areas are more highly rented than large ones, and in any case a small holding is a relatively small area from the rental point of view. It is, however, one of the advantages of, and reasons for, the concurrent interests (upon which I have insisted) that they enable the renting of a sufficient acreage of good land in a suitable situation. The rents of such parcels of land as I have in mind vary approximately from £1 to £3 per acre, according to circumstances; but although the average may be put at £2, it is seldom advisable to exceed it for the purpose we are considering, and, provided a lower figure is not consequent upon serious disabilities, it is obviously preferable. As a rule, however, a cheap rent means poor land and inaccessibility.

The capital necessary for any sort of farming has been variously estimated. Ten pounds per acre of occupation has been very generally named, and in some cases of small holdings about half that amount has been thought sufficient. For our purpose, I would suggest that the man with £500 on fifty acres would be better placed than one with £300 on thirty acres—always supposing the investment of brains and experience as well as cash.

The Scope of Production.

The opportunities for profitable production in the circumstances I have indicated are varied, and include eggs for table and setting, chickens for table, "day-old" chickens, fattening, and the raising of birds for stock; whilst, under some circumstances, turkeys, geese, and ducks, are worth consideration. But in any case the output must be more or less extensive, whether in one branch or collectively, the sufficient return depending upon an aggregation of small profits; hence the necessity for a suitable acreage and concurrent means of using the land to the greatest advantage. I have already stated that the production of eggs and chickens for table is not alone sufficient for the purpose, although in this direction the position has been improved to the extent of the better stock and methods employed; but the statement must further be qualified by what has gone before relative to the other interests, and it is certain that by making the most of the opportunities a living may be made by the combination of occupations that are possible on a sufficient area of land for the primary poultry purpose. But the relative importance of the poultry production is very considerably increased if the scope of the operations is extended to include one or more of the other objects suggested.

The older producers of eggs and fowls for market were notoriously careless of stock, as far as breed was concerned, and it remains true to-day that a very considerable proportion of those who supply such produce give very little consideration to the quality of their stock, apart from capacity to lay or put on flesh, as the case may be. The fattener cares nothing for purity of breed provided the chickens he buys from the rearers are good "doers" in the fattening coop, and the egg buyer is only concerned with the appearance and freshness of the eggs. For these purposes, therefore, the value of the stock is limited—although variable within the limits—and it matters little to such producers whether their birds are pure or mongrel, so long as they meet the particular requirements. On the other hand, the producer who is determined to make poultry farming a profitable business must approach the matter as a business man, and neglect no opportunity. There is no room for waste in any direction. It must, therefore, be realized that stock may hold a further value, and it is here that some of the modern breeds provide the material for the purpose. It is undoubted that some of the popular varieties are capable of the best egg yield, and that others breed the best table chickens. There is, therefore, no reason to use birds that are of no value except for these purposes, but, on the contrary, there is a strong argument in favour of popular varieties that will serve other as well as these objects. It cannot be denied that there is a constant and large demand for utility fowls of popular descriptions on the part of amateurs who require reasonably good stock at moderate prices. These buyers of fowls for suburban runs and country-house paddocks do not want exhibition birds at fancy prices, but desire fowls to satisfy a hobby and the household wants; but they are fashionable to the extent of asking for breeds and varieties of which they have seen something in a casual visit to a local show, or have read something in a chance note in their paper. They want popular birds, and are prepared to pay a remunerative but not an excessive price, and there is scope for reliable breeders of such stock—for sale both as chickens and pullets. Moreover, the production of birds for this purpose does not materially interfere with the marketable table chicken production, but rather follows in a suitable sequence the hatching of the best-priced spring chickens; and although the rearing to pullet size occupies a longer period, it is conducted in the most favourable months of the year for economic feeding. Further, it does not derange routine work except to the extent of the larger number of stock birds hatched and reared than are required for the renewal of the producer's own stock, which must be raised during the same period.

Included in such a general scheme there is often scope for some development of the day-old chicken trade and the sale of eggs for setting, more particularly the latter, inasmuch as the former will probably involve a greater outlay on artificial appliances than would otherwise be necessary, and I would strongly recommend the use of the hen for hatching and rearing as far as possible. No one can, of course, contemplate any sufficient production of chickens for any of the suggested objects without some use of the appliances designed for the purpose, and incubators are obviously essential for the hatching of "day-old" chickens; but otherwise it is preferable to regard incubators and brooders rather as auxiliaries to the hen than as in any sufficient measure economic performers of her duties. But these and other particulars must be dealt with more fully in a subsequent chapter.

Before finishing with generalities, something must be said about fattening, which, as a specialized branch of the industry, may be made exceptionally remunerative. Unfortunately, however, the conditions are not generally favourable to specialization in this one department of production, and where it flourishes it does so chiefly on account of special facilities that result from localization. Isolated individuals are at such a considerable disadvantage, as regards supplies, railway charges, feeding stuffs, etc., that they cannot compete on equal terms with those who fatten in districts within which most of the occupiers are engaged, or are more or less directly interested in the one occupation. The increase of fattening centres would do much for the poultry industry as a whole, but the process of development depends upon many factors beyond the control of *un*co-operative individuals. Nevertheless, there often exists some scope for fattening upon a moderate scale, or for seasons of special demand; and if this is contemplated, the poultry farmer should be prepared entirely, or almost wholly, to supply his own fattening coops from his own rearing-grounds, the uncertainty of other sources of supply in most cases inevitably limiting his operations in this direction. But it is important to remember that a part of the profit of this branch lies in the manurial product, and that this cannot be utilized upon the producer's own land unless he holds more than enough for the needs of his running stock; and it can seldom be as profitably disposed of by sale, owing to a too common lack of appreciation of its real value.

CHAPTER II

MAKING A START

Suitable breeds—Characteristics of popular breeds—The question of strain—The start—The foundation stock—The immediate return.

Specialization is a subject about which there is more than one opinion; but whilst there may be a more or less general agreement relative to the principle involved, I am of opinion that it may become too limited for the purpose we are considering. In some instances specialization may be carried to an extreme with considerable success, but I think that for the majority there is danger in severely narrowing the scope of operations. On the other hand, there are risks attending a too ambitious scheme, and there are few who can become universal poultry providers with much chance of remunerative satisfaction. Rather should the beginner contemplate a judicious blending of complemental specialized productions, and "eggs, chickens, and stock," is sufficiently wide to include more than one possible workable combination within the average capacity of the majority.

In view of the necessity to do more than produce eggs and chickens for table, the scheme of operations chiefly hinges upon the selection of breeds suitable for the combined objects. The sale of eggs for setting, and pure-bred stock, depends mainly upon the current popularity of breeds, whilst the concurrent requirements of utility demand that the breeds chosen be possessed of the requisite useful characteristics. The combination actually adopted by the individual must, however, be subject to the particular opportunities, which are so often dominated by locality and prevailing facilities. Some tell us that on the utility side it is preferable to specialize in egg production, but it is obvious that this is limited by the means of reaching a remunerative market; and in chicken production it must be remembered that the lean birds for fattening are saleable in some districts at double the price that is obtainable in other localities at the same time.

No production is worth considering where the conditions of the locality give an undue advantage to dealers and collectors. Producers are not, as a rule, able to undertake the work of distribution, and must therefore recognize the place of middlemen in the general scheme of things (as at present constituted); but they must equally guard against making profit for others out of proportion to the margin that remains for themselves. If, therefore, the locality cannot be entirely chosen on account of suitability for one line of specialization, the scheme of production must be accommodated to the most remunerative opportunities of the general situation.

Assuming that the beginner wishes to specialize in egg production or chicken-rearing, or a combination of the two, with the additional opportunities afforded by the stocking of popular pure breeds, he would do well—at any rate at the commencement—to confine his attention to the one or two breeds (as the case may be) that will meet the several requirements. This prevents an undue multiplication of operations, but does not too closely narrow the scope.

Suitable Breeds.

As an illustration, it may be as well at this point to mention two breeds that would be very suitable for use under such a scheme of combined production as I have suggested. I do not mean that the choice should necessarily be limited to the two varieties I have in mind, to the exclusion of others, but in mentioning White Wyandottes and White Orpingtons I am naming examples of deserved popularity—and the useful characteristics of these varieties are as undoubted as the fact that they are favourites. The prominence of these varieties as exhibition fowls is sufficiently indicative of that wide-

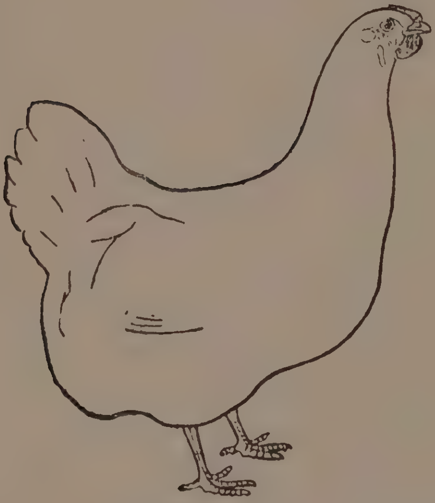


FIG. 3.—THE TYPE OF WYANDOTTE WHICH PROVED PROLIFIC IN THE 1912-13 LAYING TEST AT THE HARPER ADAMS AGRICULTURAL COLLEGE.

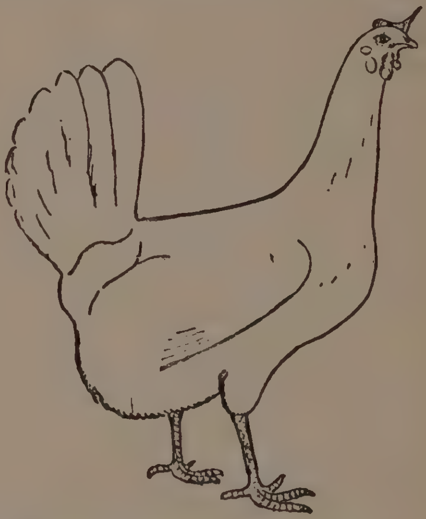


FIG. 4.—THE TYPE OF LEGHORN WHICH PROVED PROLIFIC IN THE 1912-13 LAYING TEST AT THE HARPER ADAMS AGRICULTURAL COLLEGE.

spread interest without which classes at shows do not fill, and, on the other hand, the very size of the classes inevitably stimulates inquiry on the part of amateurs. The stimulus thus given to demand spreads beyond the requirements of those who merely "fancy," and aspire to the winning of prizes; but it gradually permeates that larger section of poultry-keepers who, in stocking their runs, instinctively ask for a breed of which they see and hear much. In some instances such exhibition popularity is short-lived, mainly because it does not rest upon a sufficient basis of utility, and is consequently misleading to the rank and file of poultry-keepers. But, in the case of the two varieties named, the existing popularity bids fair to remain, and be reasonably maintained, in proportion as specialists preserve the useful qualities in the stock they breed to meet the common demand. As examples these varieties are therefore apposite in the present connection. The existing popularity is granted, and its maintenance upon a reasonable basis is probable; but although both varieties are usually included under the common description of "general purpose" breeds, their development tends in rather opposite directions. The White Wyandotte is the chosen of the egg specialist, and the White Orpington is a better table bird than layer. If, therefore, for the sake of argument, a beginner were to commence operations with these two varieties, he would be fairly equipped for both chicken and egg production, as well as the supplying of stock birds and settings of eggs to those the character of whose demand is influenced by popularity.

Characteristics of Some Popular Breeds.

Although two breeds have been mentioned, by way of example, as being suited to the requirements of a large number of beginners, it is, perhaps, as necessary as it may be useful to add a few notes relative to the characteristics of some of the more popular breeds. It should be noted, by the way, that, generally speaking, the popularity of a breed depends very largely upon its utility qualities, and that very few breeds maintain their position very long in the popular estimation unless they are at least as useful as they are ornamental. This tendency has been accentuated by the needs that have arisen under the altered conditions brought about by a state of war, and that utility aims will predominate in the future can scarcely be doubted by those who are familiar with the course of events.

Strains of birds that are primarily bred for exhibition will certainly be maintained, and the fancy side of poultry-keeping will, no doubt, be kept alive by those who are interested; but fowls that are bred for the production of eggs and meat are of greater importance meanwhile, and the industrial side may be expected to assume a greatly increased importance in the future.

Among the breeds that are most worthy of consideration from the point of view of utility—not necessarily to the elimination of ornamental qualities—are the following:

Ancona.

A fowl of the laying type, relatively small in size, mottled in plumage, very active in habit, and precocious. The breed is a very hardy one, and the chickens are easy to rear. It thrives best on a light soil, and is equally adapted to a confined run or a free range. It is possessed of excellent laying qualities, the eggs averaging seven or eight to the pound. It does not carry much flesh, but makes a very fair table bird for home consumption; it is not suited to market requirements.

Campine.

The Campine is a Belgian breed, developed mainly for utility purposes by its originators. In appearance it resembles the Pencilled Hamburgh, except in the formation of the comb, which is single instead of rose. It is capable of an excellent egg production, the eggs averaging eight or nine to the pound. It is small in body, and its table qualities are only fair. It is constitutionally hardy and active in habit, the chicks being fairly hardy and easy to rear. It is suited to confined or free conditions, but does best on a light soil.

Dorking.

An old English breed, primarily developed for its excellent table qualities, possessing as its does a full, deep body with plenty of breast meat. It is bred in five colour varieties: Dark, silver-grey, white, cuckoo, and red. Its laying qualities are only fair, but the eggs weigh eight or nine to the pound. It is hardy, does well on heavy soil, and is suited to confinement. For the purpose of the chicken producer for market it is not so suitable as the Sussex, the chickens being only fairly hardy, and taking longer to reach a desirable state of maturity.

Faverolles.

Of French origin, being the development of producers catering for the table poultry trade, with either salmon or dark-coloured plumage. The breed belongs to the general purpose class, the laying and table qualities both being good. The eggs average eight or nine to the pound. It is a very hardy breed, thriving on heavy soil, and being equally suited to free or confined conditions. The chickens are also very hardy, and easy to rear.

Game.

Old English Game fowls possess fair laying and good table qualities ; they are capable of good breast development, but there is a tendency to hardness in flesh. The eggs average eight or nine to the pound. The birds are hardy, do best on a light soil and a free range. The chickens are not very hardy, and are too restless for fattening in the confinement of coops.

Game, Indian.

The Indian Game or Cornish fowl is large and big-boned, a moderate egg layer, but an excellent table bird, preferably where size is required, the chickens not maturing early enough for the chicken trade. The eggs average nine or ten to the pound. The breed is hardy, thriving on heavy soil and free range. The chickens are not, as a rule, very hardy.

Houdan.

A French breed, largely used by French table chicken producers before they evolved the Faverolles from this and other breeds. In England the breed has undergone some modifications, and is characterized by very good egg-producing in combination with fair table qualities. The eggs average seven or eight to the pound. The breed is hardy, thriving best on a light soil, either in confinement or on free range. The chickens are usually hardy, and easy to rear.

Hamburgh.

This breed may be classed as fair, both as an egg and a table chicken producer, provided the strain has been maintained primarily for utility, which is not very usual nowadays. The eggs average eight or nine to the pound. The birds are fairly hardy, and do best on a light soil; they are adapted to either freedom or confinement, but the chickens are not very hardy.

Langshan.

If of the Croad or original (as opposed to the modern) type, the Langshan is a very good layer and a good table fowl. The eggs average seven or eight to the pound. The breed is hardy, suited to heavy soil, and thrives in confinement or on free range. The chicks are hardy.

La Bresse.

A French table fowl with a great capacity for fattening under special treatment. Its laying qualities also rank as good, the eggs averaging seven or eight to the pound. It is fairly hardy, thriving best on light soil, but equally adapted to confinement or free range. The chickens are, however, not very hardy as a general rule.

Leghorn.

Represents the Mediterranean type, precocious, relatively small, and alert. Excellent laying qualities, but only moderate as a table bird. Very hardy, suited to confined quarters or free range. Eggs average eight or nine to the pound. The chicks are hardy and easy to rear.

Malines.

Of Belgian origin, suited for the production of large fattened table fowls in winter. A fair layer, eggs averaging seven or eight to the pound; hardy, and may be kept in runs or on free range. The chicks are hardy.

Minorca.

Of Mediterranean type. Excellent layer of good-sized eggs, and very fair for table purposes. Will thrive in confinement; moderately hardy, as also are the chicks.

Orpington.

A general purpose breed of considerable popularity. Large, deep and broad in body, a good layer and table fowl; laying well in winter, and fattening well for the other purpose. Eggs average seven or eight to the pound. The breed is hardy, and is equally suited to large or small runs. The chickens are also very hardy.

Plymouth Rock.

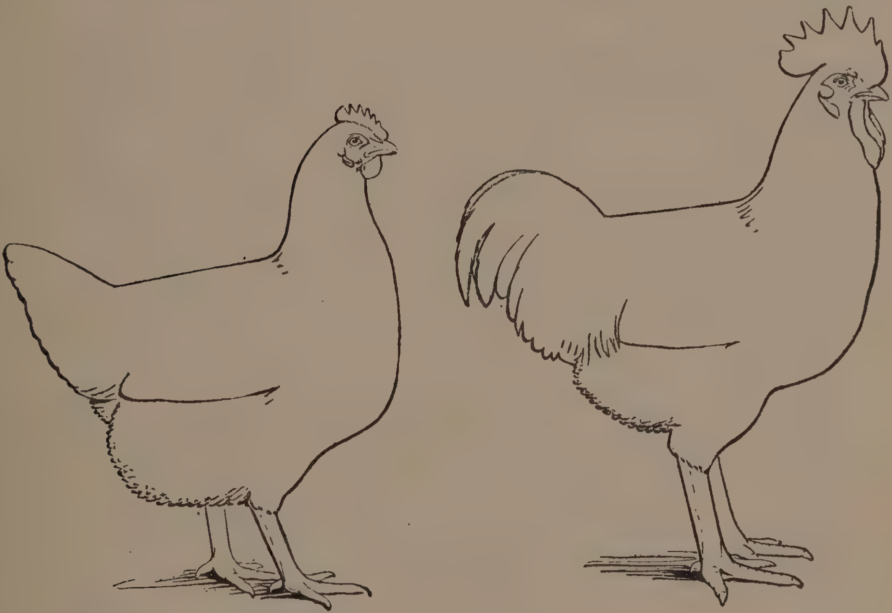
Of American origin, this general purpose breed is a good winter layer, and for the table responds well to the fattening process. The eggs average seven or eight to the pound. The breed is very hardy, and the chicks are not difficult to rear; suited to confinement or free range.

Rhode Island Red.

Another American breed, and one that has found much favour on this side. Of the general purpose type, it is a good layer and table chicken producer, very hardy, and thrives in small or large runs; eggs average seven or eight to the pound, and the chicks are easy to rear.

Sussex.

An old English flesh-producing type of fowl, evolved by a process of selection to meet the needs of table chicken rearers and fatteners; capable of considerable flesh development and rapid response to special fattening methods. A moderate layer, hardy, suited to either freedom or confinement. The chicks are very hardy, and make rapid growth. The best breed for early table chicken production.



Figs. 5 and 6.—The Sussex Type.

This type (for cock and hen) of the premier table-chicken producing breed is published by permission of the Sussex Poultry Club.

Wyandotte.

An American general purpose fowl, but one that has, in the white variety, been greatly developed for winter laying. The eggs average seven or eight to the pound. The breed is hardy, and thrives in close confinement or on free range. The chicks are also hardy.

The Question of Strain.

The application of the term "amateur" to poultry producers is rather ambiguous, inasmuch as both small and large poultry-keepers usually seek some financial reward, even if the business side is limited to the sale of a few eggs to friends and neighbours. The amateur, or the man who is more or less unprofessional as a poultry producer, is consequently generally well advised to advertise his produce, with the name of the specialist strain-maker from whom he obtained his stock. The aim of the commercial breeder, on the other hand, must be to establish his own strain and connect it by name with himself or his farm. He must necessarily commence with a foundation prepared by others, but the subsequent work is his, and the results must be made to advertise his produce, and not that of some other producing specialist. But strains and names are not made in a hurry, and a reputation for reliability is only made gradually. That side of the business is dependent very largely upon a slower development than the other, which is one of the reasons why the initial capital should be higher than some may have thought necessary; but when it develops, the man who has made the strain and the name finds that they are valuable assets, and that his enterprise has grown into something more remunerative than the mere growing of eggs and flesh.

The Start.

Having briefly dealt with generalities, as regards objects, scope, concurrent interests, personal and financial requirements, and so forth, it is time to get down to the more detailed consideration of the practical workings of the scheme of production. Any reference to possible financial results will come later, although I may say at once that model balance-sheets and estimated profits are mostly misleading, and that the personal factor cannot be calculated in advance.

The question frequently arises as to how many fowls must be kept or produced to return a given amount per week or per annum. This is in any case a difficult question to answer, and a correct solution of such a problem is, indeed, quite impossible at the period we are considering; but even if an approximately accurate reply could be given, it is not so immediately required as is a realization of the fact that it is generally unwise to start working up to the full capacity, whether of area, capital, or possibilities of direct personal supervision.

I have seen men, apparently well qualified, start right away with a full equipment involving the investment of a much larger capital than I have suggested, who have found within a comparatively short period that some unforeseen factor (perhaps quite local in character) has necessitated considerable modification and readjustment of plans, involving loss and disappointment. On the other hand, although allowance must be made for a certain experimental element in the first year's operations, our broad scheme of production makes it possible to work for some early return—beginning with a relatively small basis, and developing in the most promising directions. Whatever the previous experience as a learner or dependent, when a man takes the all-important step that shifts all responsibility upon his own shoulders, the aspect of things is materially changed; moreover, as the start is so often made in a strange locality, practices that obtained elsewhere are not perhaps equally applicable, and there are few instances in which poultry farming can be conducted upon precisely similar lines in different districts. Consequently, in starting, some of the branches of production must necessarily be undertaken upon a tentative basis. There must be no irrevocable plunging at the commencement.

The Foundation Stock.

Acting upon the principle that the first year's operations will be to some extent tentative, the initial or foundation stock will not be acquired upon a too extensive scale, it being preferable to start well within the limits of future intentions, and to build gradually. Inasmuch, however, as the future depends so largely upon the start, it is all-important to proceed cautiously in the purchase of the birds from which developments are to spring. It is therefore necessary, in most cases, for the beginner to seek advice, before accepting unreservedly all the statements of those who have stock for sale. In this connection, I may mention the advisability of the would-be poultry farmer joining such a body as the Utility Poultry Club, which, among other advantages, places at the disposal of its members the gratuitous advice of an advisory board of well-known experts, of whom no fewer than seventeen are in a position to give information relative to the stock best suited to the several divisions of the United Kingdom. The club also publishes a register of breeds, strains, and reputable breeders, which is a valuable check on advertisers.

The question of price is one that often presents difficulties to the beginner, who may be tempted to economize in this direction when purchasing stock. There can, however, be no greater mistake than to endeavour to save a few pounds at the commencement in this way, and the mere fact of cheapness should be sufficient to arouse suspicions regarding the suitability of stock offered for sale. Where pullets are coming into profit, the man who has borne all the cost of production (including not only rearing, but the maintenance of the producing stock, etc.) cannot afford to sell cheaply—if the birds are capable of an adequate return for previous expenditure. Not only must the breed be pure, and the strain the most promising for the given purpose, but—and it is a vital consideration—the fowls must be healthy, hardy, and in all respects constitutionally fit for the work, not only of production, but also of reproduction. Moreover, they must be in suitable condition, and it must at once be admitted that this is a matter about which we all require more knowledge than is at present available for practical application. It is not sufficient that the pullets are March- or April-hatched, according to the requirements of different breeds, but they must have been reared in the best possible manner to induce the desired condition. Nevertheless, even experienced breeders often fail to produce the required condition at the proper time, many pullets being too forward or not forward enough, whilst moulting is not uncommon among the pullets reared by specialists for competition in laying tests. It consequently follows that the purchaser should not only seek advice, but should also personally inspect the fowls he is disposed to buy. He requires not only good stock, but stock in good condition, because if he is prepared to pay a reasonable price he should expect a reasonably early return for his investment.

The Immediate Return.

Although the ultimate income must necessarily be upon a much more considerable scale, the profits should begin from the time when the newly acquired hens or pullets have settled in their new quarters, assuming the latter to have reached maturity. I am, of course, supposing, as previously stated, that the poultryman has had an earlier practical experience, and is therefore likely to know that the transference of stock from one place to another will hinder production for a short period; but he should also remember that it is always advisable to ascertain the method of feeding to which the birds have been accustomed. With this knowledge, he is less likely to further delay the commencement of laying by an abrupt change of food in addition to change of locality, and he will further understand how best to modify the diet with a view to bringing the fowls into profit as soon as possible.

For the more immediate returns the laying stock must, of course, be looked to, and the most remunerative season for egg production lies before the man who lays his plans and gets settled in for a start in time for autumn prices, provided he is favourably placed for the disposal of his produce to the best advantage—a necessity that equally applies to all branches of his proposed activity. The work in the table chicken department is almost concurrent, and is, indeed, quite so as regards the purchase of stock and the settlement in the new quarters ; but the business of production for the more immediate return is more closely connected with the yield of marketable eggs, to which all pens may, for the time being, be contributory in some measure. The early eggs of the breeding pens will be equally available for this purpose, at the beginning, with those of the birds penned or run separately for the special object. December is quite soon enough to commence incubation for the early chicken trade, and by that time the eggs should be suitably reliable for a high hatching and rearing percentage.

Relative to the other branches, which it is only advisable to undertake in suitable circumstances, a comparatively early return may be looked for in duckling production. At the start, provision must be made for a nucleus stock in all the departments; and whilst the accommodation and mating of breeding pens receives adequate attention, some encouragement will be derived from the filling of the egg basket at a time when values run high. In conformity with the general scheme, I will next suggest the normal sequence of production in the several departments under contemplation.

CHAPTER III

THE CHIEF BRANCHES OF PRODUCTION

Autumn and winter egg production—Spring chicken raising—
Early ducklings—Breeding and feeding.

In accordance with the previously mentioned scheme of operations, the first production to claim the chief attention is that of autumn and winter eggs; and for the output during the first season of the new enterprise the poultry-keeper is largely dependent upon the previous management of the breeder from whom he has purchased his initial stock—but not entirely. The seller must necessarily be relied upon with regard to the suitability of strain, and fitness of condition up to a given point; but it is essential that the beginner should realize the shifting of responsibility with the acquisition of the stock, as well as the results that are consequent upon the change in the situation of the birds.

It is quite possible that the commencing poultry farmer may have gained his experience upon a farm where the birds were in permanent occupation, and that his knowledge may not include the effect of change upon the laying of fowls, in which case there would probably be some disappointment at the unproductiveness that commonly characterizes newly purchased stock. However, if that fact is duly recognized, the novice will understand that he has to pick up the management where the other man's responsibility ceased, and that if he does this properly, given good stock, the birds will soon respond to suitable treatment.

There is one important point to be remembered throughout, and that is for the general purpose it is inadmissible to use forcing methods for the particular object of egg production. There are specialists who force their birds for all they are worth, and work them out in a very limited period; but however well that may suit the aim of some egg producers, it is certainly not advisable where a strain is to be perpetuated and breeding requirements are included in the scheme. There is, however, a difference between stimulating and forcing, and whilst it is quite justifiable to encourage a good appetite, with a view to an increased egg yield, any actual forcing tends to destroy the other required utility of the birds. Forced layers are quickly used up, and the excessive production induced by such means leaves them constitutionally unfit for use in any other capacity; whereas fowls that are healthily stimulated will put up a good average record as layers without on that account becoming impaired for subsequent or concurrent breeding purposes.

Feeding for Egg Production.

So large is the whole subject of feeding that no more than a few salient points can be referred to in this connection, in so far as they concern what I have just said relative to the difference between stimulating and forcing. Overshadowing all, there is, of course, the dominating factor of price; and although the market value of feeding stuffs is subject to fluctuations, practical breeders are only too well aware of the tendency to rise that has for some time been so characteristic of their food bills. Perhaps the most important question with which the producer of eggs and poultry has to grapple is that of cost.

An American visitor to this country recently told me that he found the prices obtainable for good English produce so encouraging that he would not hesitate, were he able, to invest his capital in poultry farming on this side of the Atlantic; but when I drew his attention to the serious problem of the cost of production, with which we have to contend, he was inclined to modify his enthusiasm. There is here a wide field awaiting investigation and research which well merits the careful consideration of the Development Commissions, or whatever body may be concerned with the future welfare of the poultry industry in the United Kingdom—it is a root question. Meanwhile, I can only suggest that which we commonly know as cheap foods do not give the desired results, and that, to produce eggs for the higher prices that rule in autumn and winter than in the earlier months, the cost of their production must be correspondingly higher.

The question as to whether meat should or should not be fed has been variously discussed, but I am in no doubt regarding its beneficial nature when judiciously employed, and a slight consideration of the conditions is sufficient to show the reasonableness of this conclusion. If we compare the circumstances of the natural laying season, in the growing time of the year, with the conditions that prevail during autumn and winter, when we most require eggs, contrary to the scheme of nature, it is obvious that we must make up for the deficiencies of the season in the dietary. Insects, worms, and slugs, are not available, and, unless we supply an equivalent in addition to corn and meal, we are not giving a ration that is suitably balanced for the purpose, and we are running the risk of producing fat instead of eggs. But in feeding meat it is very necessary to discriminate; and whereas the forcer of laying stock would perhaps feed up to a proportion of as much as one-fourth meat in a mash mixture, it is not advisable for the more general purpose to use more than from about one-eighth to one-twelfth —according to circumstances.

In addition, it is necessary to remember that the laying hen in winter is at a disadvantage in the matter of green food, and particularly as regards the lower feeding value of growing herbage, the various properties of which, in combination with the "animal" food, are so helpful in regard to the object we have in view. Cabbage greens and roots may be supplied, and usually are in some measure; but there is a further addition to this side of the ration that is especially useful in the winter feeding of laying and breeding stock, and that is well-cut clover hay. This should be steamed or scalded the night before use, and in the morning included in the soft food mixture, of which it may form from one-fifth to one-fourth of the quantity upon the occasions when it is mixed in the breakfast mash.

The foregoing are among the foods best suited to the requirements of laying stock in winter, and it is not until meat is used to excess that the line that divides feeding and forcing is passed. Relative to directly stimulative ingredients of the rations, perhaps mustard is one of the safest and most efficacious; by its effect upon the digestive process, greater value is extracted from the food consumed, and proportionately more material is rendered available for the production of eggs. (See also Chapter X.)

Spring Chicken Raising.

Following the natural order of production under our general scheme of operations, the raising of spring chickens demands attention at the time when the winter egg supply is looked to for the more immediate returns. In subsequent years, when the successive operations have been got into proper working order, the end of the year will see the sale of other produce in addition to eggs—such other available produce including large fat fowls, ducks, geese, and turkeys, according to individual opportunities for profitable production. But we are talking about the beginnings of the enterprise, and in such circumstances the breeding stock should be laying eggs for the table chicken purpose, whilst the pure and simple laying stock produce the breakfast eggs.

The winter is not the best season for the novice to commence incubation and rearing, but I am presupposing that the novitiate has been passed, and that the poultry farmer has gained some all-round experience. That being so, he will at least realize the importance of condition in the breeding stock—a subject to which I have already referred—and will make it his business to induce the production of a sufficient supply of fertile eggs from December onwards. The requirements of the special and remunerative demand for early chickens necessitate the putting down of eggs for incubation in time to begin hatching either just before or after the New Year. There is, as a rule, nothing to be gained by hatching out any considerable number of birds before this, but the start should not be later than the time indicated, in view of the unseasonable rearing period that must be faced. It is preferable to put as many of these eggs as possible under hens, but, as sitting hens are seldom sufficient during winter, it usually becomes imperative to use incubators as well if the early chickens are to be at all numerous.

It must be remembered that chickens that can be produced and grown to a killing size in the early months may be sold in a market that rises until May or June, and that, whilst birds may be brought to a suitable condition at or a little over an age of three months in a more propitious season, an approximation of four months will be required in the early part of the year. It consequently follows that the greater the production for marketing during April, May, and June, the higher will the average be raised in this branch, which will not, of course, be limited to the one season. Nevertheless, although the prices that may be realized are good, the cost of production is inevitably high as compared with later operations. Eggs must be used when their eating value is high, appliances must be used to augment the output resulting from natural methods, and the food bill is larger on account of the seasonable deficiencies and climatic conditions. There is, however, no economy in attempting spring chicken raising upon cheap lines, because, unless these birds are kept growing and developing, their retarded progress will result in the maturing of too large a proportion upon a falling market. This will not only involve the loss of every threepenny drop from the highest prices of the season, but the cost of feeding cheaply for a longer period may possibly be more than a relatively rapid production produced by comparatively expensive feeding. Moreover, the loss on the actual selling price will probably be increased on account of the poorer quality of the birds marketed, those that are long in rearing being less desirable for table purposes than those that are matured quickly.

The Method of Feeding.

These are points which may not have been impressed upon the beginner during his training period; and however good the general experience previously gained, the poultry farmer requires to develop expert specialist knowledge in every branch of production he takes up. Taking it for granted, therefore, that, although every effort must be made to keep the cost of production as low as possible, mere cheapness must not be allowed to influence methods. We consequently find ourselves once again face to face with feeding questions, which so persistently confront us in every department of our productive work. First of all as to the method. Various systems are advocated from time to time, and the motives of those who advance them are as varied as the arguments put forward; but in the main some personal object is to be served by the advertisement secured. But when all is said and done, and perhaps experiments have been made, the raiser of early chickens for table maintains that soft food is essential to quick growth and rapid maturity. This conclusion does not necessarily entirely exclude the use of grains and seed, or what is commonly known as "dry feed," but no experienced market producer who has his living to make would seriously attempt such a production by the use of any but a staple diet of soft food.

The feeding stuffs employed must be of the best quality, and of a character especially suited to the end in view. During the early days of rearing biscuit meal is sometimes particularly beneficial in winter weather, and boiled wheat is a good evening feed, although not always cheap enough unless grown on the farm; but for the proper growth of table chickens, from start to finish, no feeding stuff equals, as a staple food, ground oats as ground in Sussex. All foods of any real feeding value are relatively expensive nowadays, but Sussex ground oats are never really cheap, if genuine. But nothing will give equal results, in this special production, to those attained by the systematic use of finely stone-ground oats, with a sufficient admixture of fine sharps to make the soft food crumbly. It may be true that size and weight are attainable by other means, but it is not true that an equal quality is also obtained; and in the table poultry trade mere size and weight are not sufficient without fine texture, white flesh, softness, and tenderness. It is the combination of all these qualities that is necessary to the making of such prices as are alone sufficiently remunerative. It is useless for the purpose we are considering to produce second-rate produce, which must compete with the best imported poultry: only the best will serve. (See also Chapter X.)

The Sussex System.

For the special purpose we require birds of the table type—that goes without saying—but in addition they must be of a description that makes a quick and sufficient growth and development; and they must be hardy withal. There are table breeds and table breeds, but for the best and most remunerative trade we want birds that may be reared for marketing within a period of from twelve to sixteen weeks, that will respond freely to a final feeding process, and that will dress for table with an abundance of white and tender flesh. I do not say that it is the only breed for this purpose, but I am strongly of opinion that the Sussex fowl is the best; and, apart from experience, this would be a reasonable assumption in view of the history of the breed. The Malines is the outcome of the practical needs of Belgian producers; the Faverolles is the manufacture of the French producers; and in a very similar way the Sussex rearers have evolved the Sussex fowl. For the purpose of the rearer of table fowls the choice is wider, but for the production of the table chickens the Sussex breed is the most naturally suitable—although others will serve. The hardy treatment of the breeding stock is essential to the production of chickens with sufficient stamina to enable the rearer to achieve his purpose all the year round, and especially in the winter months. Constitutional fitness is the foundation of successful rearing. Given the right class of stock and a necessary condition of fitness, we may now proceed to the consideration of some methods of rearing.

The use of artificial appliances is nowadays very generally considered to be necessary, and, although I must confess to a preference for natural methods of incubation and rearing, I agree that the use of incubators and brooders enables us to do more than the Sussex henwife has been able to achieve in winter rearing. Much as I admire that good lady, I am not blind to the shortcomings of her conservatism and the limitation of her methods. She can rear better than most, and her goodman is a good second; but their system inevitably restricts their winter output. It is just here that the appliances are useful auxiliaries, but I would never regard them as other than adjuncts to the hen. I have used most kinds of brooding appliances, and my experience is that a number of what are sometimes called "individual" brooders are preferable to one large brooding house of equal capacity. When these latter were first introduced to this country, I made extensive use of one on the land I was farming, and was also enabled to make weekly, and sometimes daily, visits of inspection to a near-at-hand farm, where a whole range of similar houses was in experimental use. The result of my somewhat considerable experience has been to convince me that the system is subject to serious limitations in such a climate as ours, and for the purpose we are now considering. But, whatever the type or capacity of the brooding appliance, it is of the utmost importance to start at as low a temperature as possible and not to overcrowd. Moreover, in my opinion—despite the apparent Irishism—the most important part of a brooder is the outer run, and it is easier to accustom the chicks to the open air when they are reared in a small brooder than when placed in an elaborate Crystal Palace kind of building. It is important, in fixing the degree of temperature, to have the thermometer at the level of the chicks, otherwise the difference between the registered degrees and the heat experienced by the birds may be very different. If the lower temperature is commenced at from 85 degrees to 90 degrees—at chick level—it should be gradually reduced to 70 degrees by the third week, and all supplied heat should be discontinued by the time birds are a month old.

Preserving Hardiness.

In any case, I would always use the hen when she is available, and conduct rearing operations on the open field, placing the coops a few feet apart, cleaning them daily, and removing them about a yard away from the previous position. When the weather, the nature of the soil, and the drainage of the land, are favourable, bottomless coops are better than boards; but if the latter are necessary they should be movable, to facilitate cleaning and drying. During a spell of wet weather the chicks may be made comfortable for the night if the boards are scraped and dusted with lime immediately before shutting-up time. When cooped in a field with cattle, it is usually necessary to secure the coops by means of a heavy bat or a wire loop and peg arrangement; but if sheep are the field companions, the coops will almost surely be overturned by rubbing unless enclosed by a few hurdles. If a bullock lodge or other open-fronted shed is available, it may be utilized during bad weather to the extent of placing the coops under the shelter of its roof; but otherwise I adhere to the open-field method, and believe that Sussex rearers are wise in preserving hardiness by such means. The loss of the unfit that is inevitable at some periods is better and more truly economical than the general tendency to degeneration that is induced by artificial methods. The extremely artificial and intensive system that has been advocated during the last year cannot fail, if widely adopted, to inimically influence the vitality of stock, and very materially lower the fertility and rearing percentages. To revert to the parent stock, it must be realized that a low hatching percentage increases the rearing difficulties as regards the birds that actually survive. Moreover, the average producer renews his stock from his own production to a large extent, so that the hardiness of the rearing methods is as important as the hardy treatment of the older birds.

Small Numbers for Best Results.

Among those who rear chickens in the early months, I have noticed that, as a rule, the small rearers obtain better results than those who attempt the handling of larger numbers; and that there are better quality chickens, and proportionately more of them, on the small holdings than on the large farms. The chickens of the small rearer exhibit more sturdiness and greater uniformity in the growth and development of the broods of different ages. This result is largely due to the direct personal attention, which is so much more easily given in one case than in the other, so that it happens that chicken production carried beyond certain limits assumes an inverse ratio to profit. The rearing of chickens in a wholesale manner necessarily leads to their treatment in bulk, and they cannot be so profitably produced by factory methods. The very limitation of the operations in reality serves to increase the proportionate profit by confining the supervision of details to the capacity of one individual, who must not expect chicken-raising to be a sole and sufficient means of subsistence. In no circumstances is it a very easy thing to rear the birds that will be ready for the fattener between the middle of March and the middle of April, but, with their generations of experience, the rearers of the south-east are never tempted to depart from the open-air method of rearing—a method so Spartan that I have seen the coops containing the prospective top-price birds of the year dug out of the snow in the middle of a five-acre field. It should, however, be noted that the situation and physical formation of the rearing districts, and the division of the holdings into comparatively small fields sheltered by high and broad hedges, are all favourable factors; but where the natural advantages afforded by nearness to the coast, the shelter of valleys and wooded ridges, or the protection of fields by thickly timbered shaws, are in any adequate measure reproduced, there does not appear any reason why the rearing methods of the south-east should not be as successfully adopted.

A Fruitful Cause of Disease.

It is by no means unusual for the chickens of the inexperienced to suffer a check at the period when they are judged to be sufficiently advanced to leave the care of the hen. This is in many cases due to the transference of attention to the broods of later hatching; but it is also traceable to defective management as regards feeding, but more particularly in the matter of housing. Mismanagement in this latter direction is one of the most common as well as most serious faults, because it is not only liable to retard the progress of the birds sufficiently to prevent any profitable recovery of lost ground, but it is a very fruitful cause of disease. I have often been impressed with the sharp contrast afforded by the general appearance of the chickens upon the fields of experienced farm rearers and those under the management of painstaking but mistaken self-styled "poultry farmers." In the one case the birds are kept growing, are somewhat "cobby" as regards shape, if "gawky" as regards height, and they are healthy and active; yet at first sight their management gives the impression of being a very casual affair. In the other case, perhaps the young birds look promising, but the appearance of the older birds is very discouraging—they are either stunted or "weedy," and generally dispirited, if not actually diseased; yet the signs of management are often almost oppressive. Although it is sometimes difficult to say which item of mismanagement is the most contributory to failure when the whole system is erroneous, I have generally found that the most conspicuous difference between the methods of the two classes of rearers exists in the housing of the older chickens. The inexperienced ones allow their running chickens to crowd into coops or packing-cases, without regard to the continually altering relation of space to the increasing size of the birds; or else they house them in expensive houses which are too ornamental or luxurious to be practical. The "plant" has been the snare of countless beginners. On the other hand, the south-eastern farmer, whose annual output may be anything from 500 to 5,000 birds (how many "poultry farmers" approach this for a succession of years?), houses his "weaned" chickens in night hutches or arks—constructions which some theorists condemn as draughty death-traps, an opinion at variance with the experience of a county full of practical rearers.

The Sussex chicken ark usually measures about 3 feet 6 inches long, 2 feet 8 inches wide, and 2 feet 6 inches high. The body is set on legs about 1 foot 6 inches high, and the two pieces of quartering which form the horizontal portion of the frame at the base of the body are run out about 18 inches or 2 feet at either end to form two pairs of handles, by which an ark is easily carried by two men. About a third of one side is made to open as a door, and the floor is simply a wooden grating, by means of which the land receives the manure direct, and the cleaning of the interior is reduced to a minimum. It is made of stout timber, well tarred outside and limewashed inside. To such hutches the chickens are transferred from the coops at all seasons of the year, and know no other house until they are placed in the fattening coop. In no other type of house have I seen table chickens do so well or retain such good health and hardiness.

Feeding Stuffs and Feeding.

There remains the important subject of feeding stuffs and feeding; but the best system is a simple one, and need not detain us long. The partial use of dry feed is necessary in the case of brooder rearing, but in no case should it be allowed to entirely replace soft feeding. Soft feeding is one of the essentials in the successful production of table chickens, being conducive to rapid growth and the quality of softness that is so desirable in these birds, and to develop a large crop for future cramming. Although relatively expensive, there is no food to equal Sussex ground oats for this purpose, and the custom is to start, continue, and finishes with this fine product of the stone mill. As a matter of fact, there is usually a small admixture of sharps, but principally because its use facilitates the crumbly mixing of the food, the bulk of the whole consisting of ground oats. The meal is so mixed with water or separated milk that lumps thrown upon the ground break into crumbs. By the Sussex method of finely grinding the whole grain between specially dressed stones, a poultry food is produced that is evenly balanced in itself, its own ratio of flesh-forming to that of heat-and-energy-producing material being, on the average, that of one to four and a half, which is as near as possible to theoretical perfection. In addition, there is some use of wheat upon farms where it is grown. The wheat is boiled in coppers until the grain becomes soft and bursts, the liquor being then drawn off and used in mixing the soft food. The drained wheat is dusted with meal to separate the grains and do away with stickiness. Water is supplied the hens in pickle-bottles, but the moisture in the soft food is considered to be sufficient for the young birds. The chickens are generally started with four good meals daily; but these are soon reduced to three as the chicks get farther afield in search of natural food. The whole process is based upon the economic importance of the fact that, from the point of view of the producer as well as the consumer, it is essential that table chickens should be brought to a killing size and condition at the earliest possible age. The importance of this to the producer lies in the fact that competition makes it more than ever imperative to keep down the cost of production, and the consumer does not obtain the quality he desires in a fowl that has passed the chicken age.

Early Ducklings.

Although the productions of eggs and chickens are both seasonable, to the extent of the respective special winter and spring demands, the work in these two departments is more or less continuous, inasmuch as consumption does not cease from one end of the year to the other, increasing and decreasing in some proportion to the fluctuations of values. On the other hand, whilst it is also true that ducks may be said to be more or less in season all the year round, the duckling season extends from February to July, and those who specialize in this production do not generally extend their operations beyond the limits of the season proper. There are later demands for large, fattened ducks which may in some circumstances be remuneratively provided for; but as the greater prospect of profit lies in the early trade, it may be more reasonably included in our general scheme, where the conditions are favourable. There is, however, a vast difference between the expectation and certainty of profit; and although this is, of course, in some measure true relative to any branch of production, it is perhaps especially so with regard to the duckling trade.

The profits that once obtained are no longer realizable, the production being no longer limited to the locality that formerly enjoyed a practical monopoly. The Aylesbury methods have been imitated elsewhere; but although the success of the imitators has varied in degree, the considerably increased output has at any rate, in conjunction with other sources of supply, served to materially lower values. If, therefore, the prices obtained are to be sufficiently remunerative, the quality and condition of the produce must be first-class, and the birds must be fit for marketing before the cost of their production has become disproportionate to the possible return.

For all practical purposes the market Aylesbury is the breed best worth consideration for the early trade—that is to say, the old English stock that has been reinvigorated by some infusion of the Pekin blood, which was rendered necessary by defects consequent upon previous neglect of laws of breeding. This is the bird that provides the most desirable type and size, that is at once hardy for early rearing and a quick grower, and that is capable of attaining the necessary weight and condition within a period of nine or ten weeks—and all this is essential if early ducklings are to be made a paying side-line in the scheme of poultry farming. I say "side-line" advisedly, because there are few who can hope to be in a position to specialize in this direction upon an extensive scale, although within the limits of their individual circumstances very many may raise ducklings with some amount of financial success.

Breeding and Feeding for Market.

The great initial difficulty with which the generality of inexperienced beginners, or those whose knowledge is only of a general kind, have to contend is that of producing fertile eggs sufficiently early and numerous for the purpose. To perhaps the great majority of farmers there would be novelty in the idea of getting anything like an adequate supply of hatchable eggs at the required time. And I have before now been very decidedly told by country people that "ducks don't lay now," at a period when specialists were well advanced with the process of incubation for the early trade. There was at one time an almost equal incredulity with regard to the possibility of a winter supply of hens' eggs. Not that it is an easy matter to get the ducks' eggs when they are most required. It is mainly a matter of strain in the birds, and skill on the part of the breeder and feeder. In the birds a natural tendency not to lay out of the natural season has to be overcome, and the poultryman has to learn how best to encourage this unseasonable production.

For the early duckling purpose the breeding stock must be at a suitable age and condition for mating about October, and the object is best served by the selection of ducks that are about eight months old at the time, the drake being between eighteen months and two years of age. Their condition is mainly referable to the feeding, assuming that they have been properly grown and developed for stock purposes by the gradual building of frame and constitution. As stock birds, fatness must be avoided, and foods calculated to produce such a condition should be very sparingly used, just as a forcing diet will inimically influence fertility, although nitrogenous ingredients are required, but both vegetable and animal food are essential.

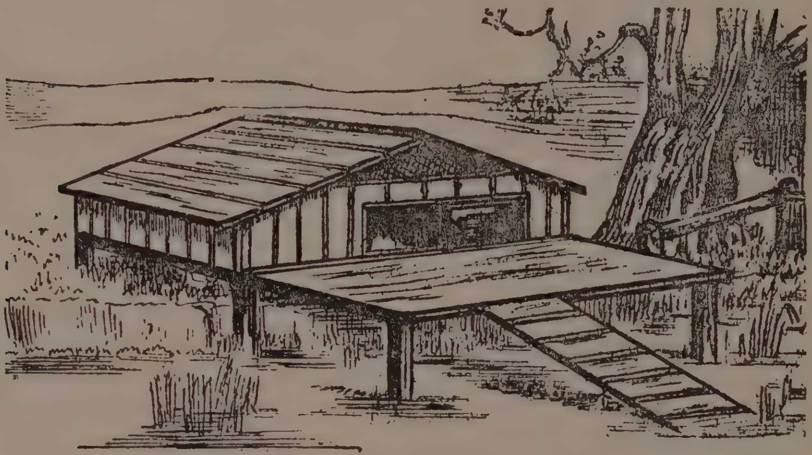


Fig. 7.—A Convenient Type of Duck House.

Suitable ingredients for winter mash feeding include ground oats, middlings, bran, Indian meal, and cooked meat; if these are used in one mixture, the approximate proportions would be equal parts of the first two (by weight), half each of bran and Indian meal, whilst the meat should constitute from about one-fifteenth to a twelfth of the whole. The feeding of such a mash in the morning should be sparing, leaving the birds sufficiently eager to induce exercise. If roots and cabbage are not available, steamed clover hay (well chaffed) should be added to the soft food; and as grit and lime are never found in sufficient quantities or suitable form, both should be supplied. Oats, wheat, and occasionally maize, may be fed at night; but many breeders prefer to feed soft food both night and morning, with grain every now and then as a change.

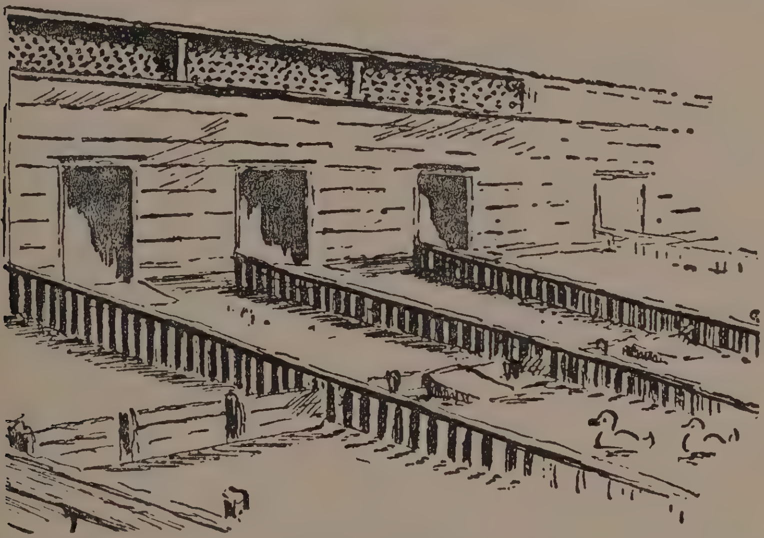


Fig. 8.—Duck Breeding Pens, showing House, Gravel Runs, and Water.

Hens or incubators are used for hatching, and brooding is not long required—from ten days to a fortnight, according to the weather. Comparatively large broods may be run together, and kept in much closer confinement than would be possible with chickens; no swimming water must be allowed, and simple housing is sufficient, provided the interior can be kept dry. The food may be varied with advantage provided the ingredients are of the right description. Well-boiled rice, barleymeal, and oatmeal, may be used, mixing either in the proportion of three parts to one of middlings. A satisfactory commencing diet may consist of equal parts of ground oats, middlings, and bran, mixed with milk. During the second week meat should be introduced in the proportion of about a fifteenth part of the whole mixture, and for this purpose tallow greaves give good results. For the last month or so barleymeal, greaves, and pollard, may be given; and some producers finish with about three parts of bulk of well-boiled rice with one part of tallow greaves, whilst others prefer only barleymeal and greaves. In the early weeks of rearing, but not during the last, any available green food will tend to the preservation of health. But, however fed, they must be marketed as ducklings—viz., before the change of plumage; in other words, at or before about the tenth week.

The early duckling production of recent years has, by its more general and widespread extension, sufficiently proved that, under good management and in suitable situations, it is as possible to breed and rear these birds during the early months in other districts as it is in that of Aylesbury, to the neighbourhood of which the undertaking was previously almost entirely confined. Many producers in other parts of the country have taken advantage of this to such an extent that their growing competition has naturally assisted in the lowering of prices for the produce sent from the original centre. What the commercial producer can do is capable of imitation, in a less degree, by poultrymen upon home farms, and private producers in general, provided they will adopt suitable methods.

It is, of course, necessary in the first place to consider the stock birds, their strain, date of hatching, and suitability of mating and feeding. All of these points should receive due attention in the autumn, otherwise their neglect will sufficiently account for a lack of fertile eggs for the production of early ducklings. The best hatching results are obtained without any forcing of egg production, although in severe weather barleymeal and greaves may be used with excellent effect, with an occasional allowance of small flat maize. With regard to the use of stimula-

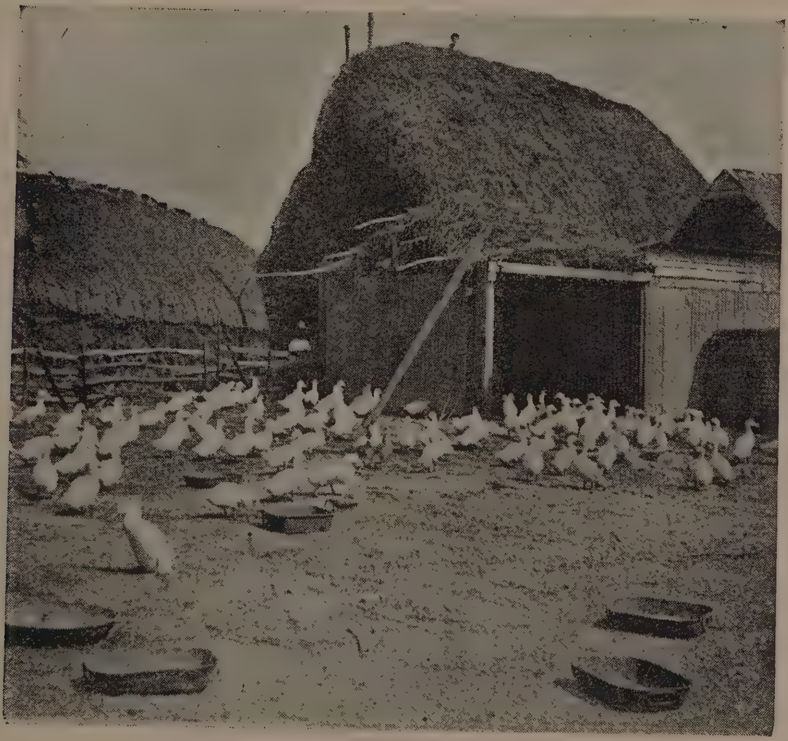


FIG. 9.—DUCKLINGS PENNED FOR FATTENING.

ting food in general, considerable caution is necessary, because an oversupply is frequently productive of egg-binding. The same cause is also very often responsible for eggs of abnormal shape or rough shells, and any deviation from the ordinary production should be at once followed by an alteration of diet, and the elimination for a time of meat food of any description. Such a course may very possibly entirely stop production, but the result of a continuance of stimulating foods after such indications of ovarian disorder would be far more serious, and perhaps fatal to the affected birds.

If the eggs are hatched under hens, as is the most usual method, the brood of each hen may be considerably augmented, if necessary, by the addition of incubator hatched birds; ducklings require very little heat during the rearing period, and practically no brooding in comparison with chickens. To such a hardy condition may these birds be brought, by the selection and treatment of the breeding stock to that end, that some of the largest Continental producers allow as many as fifty young ducklings to one hen, the birds being run in the meadows from two days old in all weathers, and with no more protection than that afforded by wattles. This method is akin to that of our chief chicken raisers, as far as its freedom and open conditions are concerned; but in both cases the stock is essentially hardy. Otherwise the method of rearing would be impossible. My own experience is that, all things considered, ducklings are perhaps easier to rear in the cold weather than in the hot, and that, although they are necessarily a cause of some anxiety in times of severe frost, they are more liable to troublesome ills in the heat of summer; but that there are natural difficulties in either extreme goes without saying.

CHAPTER IV

SPECIAL BRANCHES OF PRODUCTION

Selling " settings "—" Day-old " chicks—Pure bred stock—Fattening.

Selling "Settings."

We have already contemplated the commencement of a succession of operations, including the production of winter eggs, spring chickens, and early ducklings; and the next that follows in a natural and workable order is that of producing settings of eggs (of the pure breed or breeds kept) for sale to some of the large number of poultry-keepers who are always active buyers in the early months. The demand is a large one, comprising the requirements of those who wish to supplement their own production, and others who wish to stock a variety of which they possess no breeding pen, as well as a considerable section of amateurs who have no opportunity to breed, and depend upon the purchase of settings for the purpose of renewing their flock of layers.

The prices obtainable vary according to the character of the demands and the value of the supply strain, but are in any case reasonably remunerative; moreover, as the value should increase in proportion to reputation and length of breeding record, this is a branch that usually pays for development. In conformity with the general scheme, I am not suggesting that the beginner should embark upon the breeding of exhibition stock as such, but rather upon the broad basis of utility, and such approximation to standard requirements as are compatible with the preservation of useful qualities and constitutional soundness, and there is a large market for reliably bred pure breeds of this description, both stock birds and their eggs for setting.

This branch of the poultry farmer's business is of such a nature that it is above all things necessary, in offering eggs for hatching, to take all reasonable precautions in the endeavour to minimize the inevitable uncertainties that characterize such transactions. The trade in settings has acquired a rather unfortunate reputation, due partly to the ignorance of well-meaning novices, and partly to the mean advantage that is sometimes taken by those who know better, and as a consequence every spring produces its crop of complaints from dissatisfied purchasers. The primary aim must, therefore, be to create confidence, and this may be done in some measure by the acceptance of responsibility within due limits.

The fertility percentage is obviously an unknown quantity to both parties to the deal, but in return for a sufficient advance in price the seller should guarantee to replace the tested-out clear eggs, or, as an alternative, to offer fifteen to the dozen without guarantee. It is, however, obvious that the breeder cannot foretell the proportion of typical birds relative to the unincubated progeny of a given mating; but he must exercise every care in breeding, with a view to the reduction of the number of wasters. The buyer is justified in expecting a certain level of quality, and the success of such transactions must largely depend upon the careful selection of the eggs, as well as the skilful management of the breeding stock and the conditions under which the birds are kept. The usual guarantee is for fertility only, but the breeder should only send out eggs that in size, shape, and general appearance, are normal and characteristic of the producing breed. It is, moreover, a wise proceeding to extend the guarantee to cover age, three days being a reasonable limit for hatchable eggs.

In the case of settings of eggs produced by a strain of pedigree layers, the sale is materially helped by the good performance of pens of the advertised strains in the competitions of the Utility Poultry Club or the National Utility Poultry Society; and on this account it is, from a business point of view, generally advisable to take part in such tests. It must, however, be remembered that there is much doubt regarding the possibility of giving such a character as prolificness, but that the best results in this direction involve the establishment of blood lines, although in-breeding must not be so close as to endanger the vitality of the strain or family.

The Traffic in Eggs for Hatching.

The success of the buyer and the reputation of the seller must in relation to such transactions depend largely upon the careful selection of the eggs, in addition to the skilful management of the breeding stock and the conditions under which they are kept. The size, shape, and general appearance, of the eggs should be normal and characteristic of the producing breed. Any that are too large or unduly below the average must be rejected, in common with those that are badly shaped, or rough, or thin in shell. The usual guarantee covers fertility alone, but the seller should be careful to select, and the buyer to see that he receives and accepts, only those eggs that have at least the appearance of suitability. In addition to the proof of partially developed embryos revealed by the testing lamp, the presence of which releases the seller from his bond, both parties to the transaction require the subsequent satisfaction that results from the hatching percentage and the sturdiness of the chicks. Moreover, as the age of the incubated eggs is a factor influencing the final, if not the more immediate, results, the guarantee should be extended—as is now sometimes the case—to cover this condition, three days being a recognized limit. For the rest, among the influences that are unfavourable to hatchability are conditions of close confinement, to which breeding stock is too frequently subjected; and although amateurs with insufficient space for the purpose often aspire to the production and sale of settings of

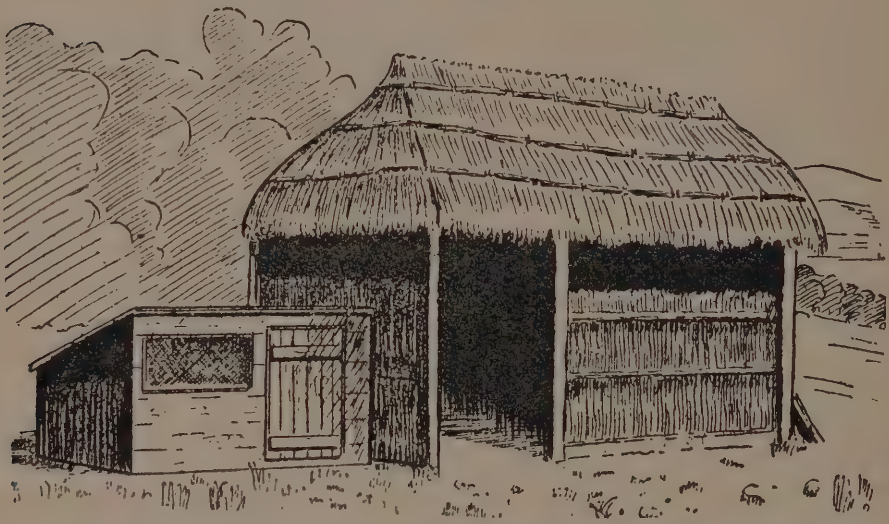


FIG. 10.—HOW TO UTILIZE AN EXISTING SHED FOR SHELTER.

eggs, prospective buyers should remember that the situation and surroundings will have a direct bearing upon the results.

Leaving the amateur out of the question, the purchaser of eggs for hatching from those who are more commercially interested in their sale should require the assurance that they are the produce of the seller's own breeding pens, assuming that his reputation in connection with the breed has influenced the purchase. Advertisers who are chiefly collectors and distributors of settings may acquire a reputation the distinctive character of which is hardly appreciated by the novice; but a breeder's reputation is neither easily nor quickly made, and is therefore, as a rule, more jealously safeguarded. The quality of the labour employed by breeders whose operations are at all extensive has, or quite conceivably may have, a very direct bearing upon the reliability of the eggs offered for hatching purposes, and those who have made a sufficient reputation to encourage a larger production should carefully consider possible results before they entrust the care of breeding stock to pupils. A present premium is not worth the risk of reputation.

That there are pitfalls for the novice in an indiscriminate purchase of settings is undoubted, but the same is true of the unguided and misguided acquisition of stock birds. Such risks are part of the price paid for experience, but this need not be too dearly bought if beginners would but be circumspect in their dealings. In the purchase of eggs from the first pen, and often from the second, of a reputable breeder, there is always the sporting chance of hatching progeny superior to the parent stock; and this is part of the price the breeder pays for consistency with his reputation.

"Day-Old" Chickens.

This production works in very well with that of settings, and both depend upon judicious advertising and arranging operations to meet requirements. Not unnaturally, the beginner is liable to be confronted with difficulties in this connection at the commencement, and the earlier he can succeed in booking orders in advance of production, the better will he be able to manage. If the production is not properly anticipated in the preliminary advertising, a large number of the eggs intended for sale as settings will have to be incubated, and many of the "day-old" chicks will outgrow their description; but, on the other hand, the combination of branches is so far complementary and successive in operation that the chicks left on hand may be reared for use or sale as stock or for other purposes. But the exercise of caution is very necessary in the beginning of such an enterprise.

It is quite true that the demand for "day-old" chickens has grown considerably, but it is equally true that producers are numerous, and it is inevitable that there must be limits. Nevertheless, there are many instances of those who were a few years ago novices in this branch who have developed it into a relatively important business. But here again, as in relation to the sale of settings, the future extent of the trade and the measure of financial success depends upon the building and maintenance of a reputation for reliability; and this is mainly referable to condition and general suitability of the parent stock. The eggs must be hatchable and the chicks must be rearable, and both must be at least good average representations of the descriptions offered.

In both these departments the work is confined to seasonable limits, the sale of eggs for setting being more strictly limited than that of newly-hatched chicks, although in both instances there are extended demands for certain purposes. There are, for example, the requirements of producers of table chickens, but it is questionable as to how far the out-of-season needs may be profitably catered for, and, as far as our general scheme is concerned, it is preferable to confine the output in these two branches to the seasons of general demand and better prices.

One result of the largely increased facilities offered by the use of modern incubating appliances has been the very considerable growth of the trade in newly hatched chickens. When the practice of hatching large numbers of birds for sale within a comparatively few hours of their emergence from the shell was first adopted in this country, it was not unreasonably supposed that the supply would tend very quickly to exceed the demand, and no doubt at the commencement the balance was not always easily adjusted. It is, however, a remarkable fact that there has been a steadily increasing output of day-old chicks during the last few years, and that those who undertake incubating operations for this purpose have been encouraged to increase their incubator capacity. In many cases exceptionally large machines have been installed in the endeavour to cope with the demand, and the introduction of mammoth incubators has brought the establishment of a system of hatching stations within measurable distance.

Those who are most favourably situated to produce good results are the operators who incubate the eggs of their own fowls. Control of the breeding pen is an important factor, the hatching percentage depending largely upon the selection, mating, and management, of the stock, and proximity to the hatching machines. A large proportion of the total production of day-old chicks takes place at establishments where such suitable conditions exist, and the buyer is able to select the breed and strain he requires. Several of the foremost egg-strain specialists, whose birds have made good records in laying competitions, now include the production of day-old chicks as well as of eggs for setting in their operations, the former being very commonly sold at approximately double the price of the latter. The output of day-old chicks produced from the breeders' eggs hatched on the premises must necessarily be more limited than when the incubators are supplied from several sources, but the results are more certain. Nevertheless, although the operations of the majority are limited, there are several individuals in the country who hatch quite large numbers during the season. For example, there is a farm in Scotland upon which the annual production approaches 100,000 chickens, which are disposed of at from one to three days old.

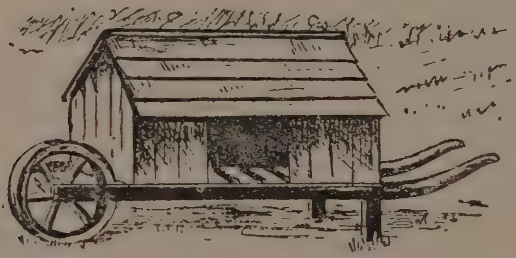


FIG. 11.—A HANDY FORM OF CHICKEN HUTCH.

It is commonly assumed that the extension of this trade must affect inimically the trade in eggs for setting, but it is more probable that it will result in a readjustment of those two branches of production. The establishment of co-operative hatcheries situated in districts occupied by a sufficient number of breeders may be a matter of future development. Meanwhile the present growth of the day-old chick trade does not necessarily imply a corresponding decrease in the sale of eggs for hatching. It is more probably indicative of a steady increase in the number of poultry-keepers.

Assuming that the producer of the chickens has control of the breeding pens, or is drawing his supply of eggs from reliable sources, the trade is one that possesses several advantages. Apart from the small urban poultry-keeper, whose wants some enterprising operators of incubators are now (as I have already mentioned) attempting to satisfy, there are many poultry-keepers who find it difficult to undertake hatching on their own account, whilst in any case there is the advantage of buying birds rather than the possibility of producing them from purchased eggs. There is much less risk of

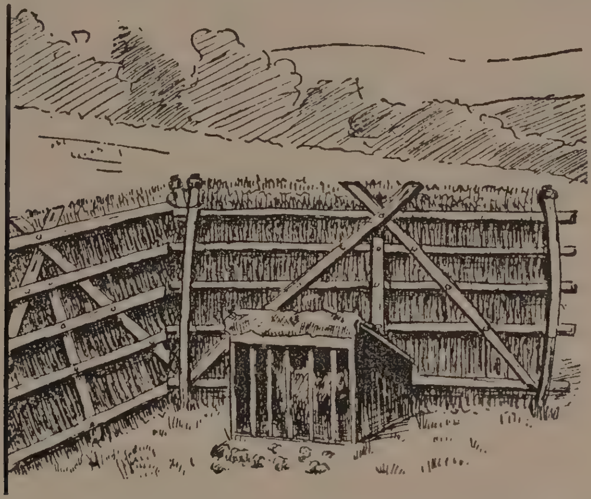


FIG. 12.—PROTECTING AN EARLY BROOD OF CHICKENS FROM COLD WINDS.

loss in sending day-old chickens to a distance than when eggs for hatching are similarly despatched. However well the eggs are packed, the average hatching percentage is lower than when they are incubated without undergoing a journey. But properly packed newly hatched chickens are seldom the worse for travelling. As a rule, for all ordinary distances they should be sent away within twenty-four hours of hatching, or as soon as they are dry and have recovered from the effort put forth in hatching. If they are kept until it is necessary to feed them, there is the strong probability that they will suffer from want of food; but if despatched as soon as they are ready to be packed, they will travel long distances without harm. Most of the poultry appliance makers sell boxes especially designed for the purpose. The success of the undertaking depends very largely upon the proper treatment of the birds upon arrival at their destination, when they require warmth rather than food. They should be placed in a heated brooder or in a basket before a fire, and after a sufficient interval fed with warm soft food, such as scalded biscuit-meal or oatmeal. They may then be reared in the ordinary way, either in brooders or by hens, and if the latter are sufficiently broody there is no great difficulty in getting them to mother the chicks.

Stock-Raising.

This branch of poultry production is capable of considerable development, and the business scope in this direction has been largely extended during recent years. Not only has the demand for pure bred stock in this country grown in proportion to the amateur's realization of their greater advantages and possibilities, as compared with the nondescript flocks previously kept, but an almost world-wide market has been created for British breeders' birds. Efforts to foster the demand from beyond the seas have latterly received official recognition and encouragement, and it is a notable fact that the Board of Agriculture and Fisheries have done their part in extending the knowledge of the excellence of British breeds throughout the Empire and in foreign countries.

When, in 1910, the Board issued a handbook entitled "British Breeds of Live-Stock" (primarily intended for the information of foreign agriculturists visiting the International Exhibitions, but as well for all interested in breeding and exportation), they included a special section dealing with poultry, and editions of this book have also been published in French, German, and Spanish. Such methods of dissemination cannot fail to produce fruit, and the results are seen in the growing export trade in pure bred stock, in which several specialists are engaged remuneratively. It may not be that every poultry farmer can at once, or even ultimately, develop an important export business, but profitable possibilities undoubtedly exist. Meanwhile, the nearer opportunities are reasonably encouraging, and give the breeder of good stock an advantageous outlet that was long neglected by the older school of utility poultry producers.

In this branch, as in others, it is very necessary to maintain a high level of production; and although no breeder would be expected to part with his best stock, which must be reserved for his own pens, it is only the short-sighted who would dispose of mere wasters in supplying this demand—there is another outlet for the rejected unit. Not only must the raiser of pure bred stock select for sale such birds as are typical and approximate to the required characteristics of their respective breeds, but he must insure that they are the healthy progeny of sound and well-mated parents. Moreover, they must be hatched during the proper season for the purpose, and reared suitably for the object. If all reasonable conditions are fully and adequately complied with, a remunerative price may be required and received; and buyers should by this time understand that cheap stock birds cannot give them value for the money.

Fattening.

The transaction from stock-raising to fattening may seem abrupt; but although the operations are very different, and the demands catered for very dissimilar, the latter is a very suitable and convenient outcome of the former, as of other work in the breeding department. As I have already said, specialization in the fattening branch of production can only be successfully undertaken by a limited number of individuals who occupy holdings in favourable localities, or by co-operative endeavour; but in a small way it is open to most to make it a profitable adjunct to their main branches of work.

In the breeding of pure stock upon any extensive scale there must always be a proportion of wasters that cannot be used or disposed of as duly representative of their breeds, whilst the production of cockerels is commonly excessive. Now, such birds may usually be got rid of through various channels, and are, perhaps, in most cases sold to higglers or dealers; but it is the common complaint that the prices realized by such methods are disproportionate to the cost of production, the fowls having been at least as expensive to rear as the very best specimens produced. It is consequently not only open to the raiser of stock to try for a better return, but would generally be worth while learning enough about fattening to get such birds into a good marketable condition, and thus secure their highest available value as dead table poultry, for which a market may be found either locally or in the Metropolis.

A limited production of this description should be, as far as may be, timed for seasons of special demand, and the man who finds himself with surplus and more or less unsuitable stock towards the end of the year would in many cases do well to aim at the increase of weight required in the December market. The culls of an earlier rejection may be "finished" for the seasonable London requirements, and on the average it should be found a more profitable disposal than the "sacrifice" that generally characterizes the sale of such birds to ordinary collectors, although it is obviously not the most economical method of producing table fowls.

What the stock raiser has to consider is how he may best obviate or minimize losses that may result from the inevitable proportion of undesirables that result from breeding for other purposes, and to this end it may be economy to increase the cost by fattening further, if there is a reasonable prospect of an adequate return. As to how far the use of the cramming machine would be justified must, of course, depend upon circumstances; but it would not be advisable unless the number of birds dealt with is sufficient to warrant the additional outlay on plant.

It is evident that some of the breeds that may be reared for stock would be quite unsuitable for the table purpose, but it is safe to say that in the great majority of cases fowls of the "general purpose" description predominate; and as these include most popular varieties, they are more profitable all round, and may be made to serve the several purposes of production that we have been considering. Given a good "general purpose" breed, the specimens that are not good enough for stock are not necessarily useless for table, and may, in fact, be among the best for that end. In any case, it is preferable that the general average of such wasters is suitable, and that it is worth while to trough-feed them, if not to cram, in confinement until they are in a good killing condition. (See also Chapter X.)

CHAPTER V

FURTHER POSSIBILITIES

Geese and Turkeys.

Geese.

All that has gone before applies in some measure to owners or holders of land of small or large acreage, but that which remains to be said relative to the production of geese and turkeys only concerns those who have a sufficient area available to enable them to stock these large birds profitably as regards feeding. Following the natural order of the various productions included under the general operations that may be described as poultry farming, the rearing of goslings is the next matter to engage attention. This work is best and most remuneratively undertaken by those who have a sufficiency of grassland to allow for the grazing of their birds without displacing or interfering with other stock; and unless there is a considerable extent of waste or common land suitable for this purpose, the production should be strictly limited. But in no case should it be large, unless the demand is sufficiently encouraging.

During recent years the trade in these birds has undergone a considerable change, necessitating a general modification in methods and restriction in output. The demand for Michaelmas geese has dwindled, and the market requirements have become spread over a larger period. "Green" goslings, or young birds killed off the grass, are nowadays more or less in request from the earliest time that they can be brought to a killing age; and there is a further and later market for such birds as are run on and fattened. May and June are generally favourable marketing months for the young birds; and although the distinctive goose market has practically ceased to exist at Michaelmas, limited requirements may be met from the commencement of the season until October, whilst large fat birds may be profitably disposed of during the Christmas season.

The producer should, however, be at some pains to ascertain the prospects as they affect him individually, otherwise his work in this branch will be of a very speculative character. The reasons for this are the inequality of the demand and the competition of foreign birds at a more favourable wholesale price; and, as regards the end of the year requirements, the premier position occupied by the turkey. Speaking generally, therefore, the best chances for the English producer exist in connection with the early market. For this purpose the breeder and rearer for market will find his best stock in a cross between the Embden and Toulouse. He must aim at a commencement of egg production in February, and must feed the goslings for the attainment of a killing condition under three months of age. But for the economical accommodation of the stock birds and the goslings a sufficient grass range must be available, otherwise the cost of production and of maintenance will be excessive.

The Rearing of Goslings.

When it is desired to rear as many birds as possible in a season, all the earlier eggs should be set under hens, the geese not being allowed to incubate until the end of the production of their second batch. The laying period commonly extends to the end of June or the beginning of July; and when geese are discouraged from sitting until the end they will usually continue production throughout the season, with an interval of a few days only. A barndoor hen will cover four or five eggs, and a goose from ten to twelve. If the nest is properly made upon an earth bottom no damping or sprinkling of the eggs is necessary, but those under hens should be turned when the birds leave the nest to feed. Clean hatching without any difficulty is the rule rather than the exception, provided the producing stock be healthy and mature—and young birds are not reliable breeders. Nevertheless, it is sometimes necessary to render some slight assistance, to the extent of gently breaking away a portion of the shell; but this should only be done when the gosling has already chipped the shell, and its efforts to extrude have been unduly prolonged. It should be noted that, although the period of incubation is generally stated to be from twenty-eight to thirty days, it is (in my experience) more often the latter than the former.

Goslings require very little brooding, and when hatched by hens they may very well be put out in ordinary coops, the hen being removed at the end of a week or ten days, and the young birds transferred to a hutch as soon as the floor space of the coop is inadequate. A goose and goslings must necessarily be provided with a roomy hutch from the commencement. The young birds should only be confined to small pens until they are strong on their legs and are beginning to graze freely. After the first day they should be fed frequently, but not much food should be given at a time. The first food may suitably consist of biscuit-meal, well scalded and dried off with fine sharps, together with finely chopped dandelion leaves. After a week this may be changed to Sussex ground oats, boiled rice, and dandelion leaves; but they will thrive on any ordinary meal diet used for chickens, provided the green food addition is not forgotten. Soft food mixture must in all cases be crumbly. If suitably penned, the young birds will begin grazing in the first week, and when they do so freely their progress will be rapid. The supply of other food must, throughout the rearing process, be regulated according to the quality and quantity of the herbage to which they have access, but it is uneconomical to allow the birds at any time to depend too much upon grazing. Inasmuch as goslings grow very rapidly in favourable circumstances, when they have made a good start, it is particularly necessary to provide adequate accommodation.

After the early days of rearing some difference of treatment is required, according as the birds are intended for early killing or are to be run on for the autumn or winter, or for stock purposes. No doubt many farm poultry-keepers have been reluctant to breed these birds in consequence of the decline of the Michaelmas demand, but it should be understood that there is a more recent compensation and increasing demand for goslings in the earlier months. Goslings that are killed off the grass do not need special fattening, provided the feeding has been suitable, and they should not be allowed on the pond;

their run must be more limited than in the case of birds that are to be held over for later requirements, but the grazing must be good. It will generally be sufficient, at the end of the fourth week, to feed generously twice a day upon a mixture of barleymeal, middlings, and brewer's grains, or Sussex ground oats and middlings. I have not found meat so desirable or essential as some suppose, and a quick-growing strain of cross-bred goslings will generally make sufficient progress on a diet of grass and good meal mixtures, being ready for killing at from two to three months of age.

Greater freedom should be allowed the birds that are to be reserved for September; otherwise their early rearing should follow the same general lines. As soon as they are sufficiently advanced they may be allowed to graze over a wide area, until a month before killing, when their liberty must be curtailed. Until then they must be sufficiently fed to maintain a good condition, without fatness, and they may be finished on stubbles or given a month's course of special feeding. Again, goslings that are to be retained for a still longer period may be run right along with the old birds from the time of feathering, and fed and housed in the same manner. In any case, a long rearing period makes it essential to practise economy in feeding, but this must on no account be understood to imply such an excess of frugality as to cause loss of condition. For winter use, as for autumn, the final four weeks must be devoted to a special course of feeding, with the difference that the birds should be confined to a shed and generously provided with fattening foods.

Turkeys.

The range for these birds should be even larger, and certainly more diversified, than for the foregoing. Geese will thrive and be content so long as they have access to a sufficiency of growing herbage of good quality and condition; but turkeys are essentially wanderers and foragers, looking for food of various descriptions, over a wider area, and preferably including grass, arable, and wood land. Moreover, the young birds must be maintained in good condition and kept growing and developing during a relatively long period, so that unless they are enabled by the character of their range to find plenty of food, both insect and vegetable, the cost of rearing will be disproportionate to the return.

Geese, being grazers, will keep on the move so long as there is grass, even if the area occupied for the time being is relatively small; but the nature of the food sought by turkeys, and its wider distribution, necessitates greater opportunities for foraging. More than the saving on the food bill is involved in this consideration, although that is a sufficiently important factor in economic production, continual activity being essential to thrift and the preservation of health, without which progress is checked and the prospect of adequate profit is reduced.

The average small holder should, therefore, have nothing to do with turkey-raising, although if he occupy the maximum acreage allowed this class he may, in suitable circumstances, undertake a small output. It is the farmer, as distinct from the small holder, who is most favourably placed for this purpose, and with many such the opportunity exists for making turkey-rearing a considerable and specialized branch of production, bringing a by no means insignificant return at the end of the year, and one that includes a reasonable margin of profit.

Turkeys are practically in season from November to April, and turkey poults from July to October; but of course the period of special demand, when size and weight are of more particular importance, is limited to the Christmas season. At other times the majority of consumers require birds of medium weight, and there is a large and increasing demand for hens of from 10 to 14 pounds. The Bronze is the favourite variety for market production, and when in-breeding and the use of immature stock are avoided, and the birds are kept during the winter in a suitable condition for early laying and fertility, April is the best hatching month for the general purpose, whilst birds hatched late may be disposed of as poults if bred from stock in good breeding condition. The progeny of sound parents should not be difficult to rear, but they should be fed for consistently progressive growth and development.

Turkey-Rearing.

Success in turkey-rearing depends mainly upon the suitability of the treatment to which the young birds are subjected during the early days of chickenhood. It is during the weeks preceeding the period at which the youngsters "shoot the red" that they are prone to justify their reputation for delicateness of constitution, but with reasonable care trouble need not be anticipated. So far as possible open-air conditions of rearing should be preserved, and it is better to provide temporary shelter when required than to confine these birds to sheds or buildings. The principle of the open-fronted roost house, that should be adopted in accommodating the stock turkeys, should be applied in a modified form to the coops occupied by turkey chicks. I have found it most satisfactory to replace the ordinary wooden coop door by a frame covered with small-mesh wire netting, covering this wholly or partially with canvas, according to the severity of the night conditions. It is important during the early days of rearing to keep the young birds dry, but at all times they must have a sufficient supply of fresh air, and occupy clean ground, covered with a growth of short grass. A coop to accommodate a hen turkey and a full brood of chicks should measure about 4 feet in every direction, with the roof rising another foot in front. Although large, the space is not too great; but when a common domestic hen is acting as foster-mother the coop may be smaller, but not as small as the ordinary chicken coop.

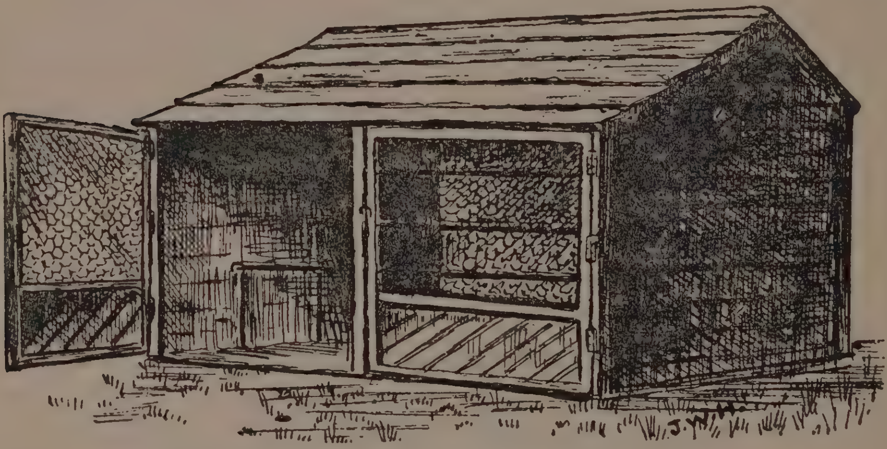


FIG. 13.—OPEN-FRONTED TURKEY HOUSE.

The whole front made to open to enable the birds to fly out from their perches.

Except for the periodic removal of shells during the progress of hatching, the birds should not be further disturbed until some hours after the completion of the process, when hen and chicks should be removed from the nest to the coop. It is preferable to feed the hen before introducing the chicks (which need no food for eighteen to twenty-four hours) and shutting them in. The time of the first meal necessarily depends to some extent upon the time of the day or night that hatching is completed, but in any case a sufficient interval must elapse between hatching and the commencement of feeding.

Neither at the beginning nor at any subsequent period do turkeys require heavy feeding; their digestive system is better able to deal with small quantities of food at reasonably frequent intervals. Feeding should commence early and be continued until late in the day, and the newly hatched chicks will require about six meals daily, the number being gradually reduced as the birds grow and extend their foraging operations. They may be started on a diet of stale crumbs of bread, well soaked in sweet milk and squeezed dry; raw egg may be added after the first few days to the milk in which the bread is soaked. A better mixture may be made of steamed rice and scalded biscuit-meal, dried off with oatmeal or fine sharps, whilst another excellent method is to feed curds and fine oatmeal. Following any of the foregoing commencing mixtures, Sussex ground oats and sharps may very well be used, and some rearers use no other food from the time of hatching onwards, until grain is introduced. At all periods green food is an essential ingredient of the dietary, requiring particular consideration during the early days, when the birds do not consume much growing herbage. With all soft food an admixture of dandelion leaves, finely chopped, is very beneficial. The properties of the dandelion make it especially suitable for use with a curd diet. Onions may also be given to these birds with advantage, if chopped sufficiently small. Water or milk may be given the birds to drink, but the supply must be pure and fresh, the vessels being frequently and thoroughly cleaned. Sharp grit of a suitable size must be available at all times.

During the third week a change of diet may be made and the meals reduced in number. When the chicks have reached that age they may be given any of the foods that are suitable for feeding ordinary chickens, but the staple diet should preferably consist of Sussex ground oats, sharps, and fine-grade biscuit-meal. Wheat, boiled, strained, and dried with meal, may be given as an occasional change. Meat in small proportion may be gradually introduced into the ration, unless there is a good supply of insect food available. For this purpose granulated meat or a good meat-meal may be used, whilst rabbits, well boiled and cut into small pieces, are suitable, and the broth may be utilized for mixing the meal on alternate days. The quantity of food must be carefully regulated, and only as much given at a meal as the birds will eat with evident relish. Grain feeding should be commenced early, otherwise some difficulty may be experienced in getting the birds to adopt the changed form later, and it is desirable to induce them to eat a good proportion of hard food as soon as they have made sufficient progress in growth and development. At the beginning a small quantity of dry chick feed may be given, and subsequently the grain commonly fed to fowls, whilst the feeding of new corn when available is helpful. There must, of course, be a corresponding reduction, but not a discontinuance, of soft food mixture when hard food is gradually introduced.

The secret of success in turkey-rearing is to make the treatment of the birds progressive throughout as regards the changes of food, constituents, and quantities relative to the character of the range and its extent, and also in the matter of the suitability of the housing. When the birds begin to cover much ground, the rations must be regulated to balance the insect and vegetable food found on the range, and before they have outgrown their coops and hutches they must be removed to larger quarters.

CHAPTER VI

HOUSES AND HOUSING

How to make—Suitable timber, etc.—Types—The colony house—Semi-intensive and intensive houses—Coops and hutches.

Upon a farm or holding of any sufficient size there will be certain buildings—of sorts. We are not, however, very much concerned with these in the present connection. There is other stock to be considered, and the existing buildings will doubtless be more or less suitable for their accommodation; and in so far as they are unsuitable, the matter is one for arrangement with the owner or his agent. In most circumstances the houses for the poultry must either be made or bought ready-made, and of the alternative the latter is preferable. In view of the cost of well-seasoned material, its carriage, and the usual inefficiency and wastefulness of home carpentry, there can be no question about this matter. For the average man it is much more economical and generally satisfactory to purchase sectional houses from reliable makers. Strong, well-made houses are obtainable at such relatively cheap rates that there is really very little temptation to attempt that which, I suppose, most men think so easy—until they try. Of the various types of houses now catalogued by makers, the most serviceable for the general purpose, as regards stock birds, is that designed for field use—and most manufacturers specialize in this direction. Such houses are constructed with a wire netting portion and adjustable shutters, and are, of course, rendered movable by means of broad and sufficiently large wheels. In estimating the required number, it should be remembered that twenty-four or twenty-five birds should be the largest number run together in one flock, when the fowls are run out on the fields.

In the case of permanent houses for the accommodation of laying stock, particularly during winter—and of such birds as are being trap-nested—the open-fronted system should be adopted; and in addition scratching sheds should be provided, and in some cases covered runs are also a desirable adjunct. Moreover, fixed houses and pens should be situated in as sheltered a position as possible, and, where necessary, evergreen shrubs should be planted or temporary faggot wind screens. Among general housing rules the following should be observed: Each fowl should be allowed 10 cubic feet of air space and about 9 or 10 inches of perch room in the roost house, and an approximation to 6 square feet of floor space in a scratching shed or shelter. Dropping boards, when used, should be from 2 to 2½ feet above floor level, and about 6 inches from the perches. Trap nests, of a simple type, should be placed above floor level to facilitate easy working without the derangements caused by the scratching material. Coops must be sufficiently large and well ventilated to allow for the requirements of growing chickens, and for their removal suitable hutches or intermediate houses must be provided.

In estimating the required incubator capacity, it is well to be on the safe side to the extent of calculating upon a hatching percentage of no more than from 50 to 60 per cent. on the average, and the accommodation of brooding appliances should be reckoned at half their assumed capacity; otherwise the birds may grow out of them too soon. It is more particularly in connection with the purchase of appliances for incubation and rearing that the beginner would be well advised to restrain his ambition at the commencement, because, unless he is going to make the production of "day-old" chicks a special line, he must endeavour to do the bulk of this work by the use of hens. Even in the case of the "day-old" chick trade, a demand must be cultivated before the production is undertaken upon any considerable scale. Appliances of this description are quickly obtainable, and the plant may be increased with growing requirements; but it is easy to sink too much capital in plant at the beginning, and to regret it subsequently.

Although under normal conditions it is in many circumstances more satisfactory, as well as cheaper, to buy most poultry houses and appliances in a finished state from the manufacturers, there are conditions under which it is preferable, if not imperative, to construct them on the poultry-keeper's own premises. Indeed, many poultry house and appliance makers recognize this fact, to the extent of including timber and other unmade material in their catalogues. It is, in any case, desirable to possess some knowledge of suitable materials and methods of construction, and, with the wish to avoid or explain as far as may be any tiresome technicalities, I propose to give such necessary information as experience has taught me may be useful to the amateur builder of poultry houses.

Before entering upon a consideration of the particular materials necessary for houses of various classes, movable or permanent, it will be useful to say something relative to the most important materials in common use for the purpose, some of which, however, will be unnecessary in some instances.

Suitable Timber.

For most purposes the body of a poultry house is made of wood, and, of all descriptions of timber woods, those most generally used belong to the class variously designated in this country as fir, pine, and deal. The first two names are used because the timber is derived from one or other of the trees named, but the common use of the term "deal" is confusing. Properly, deals are pieces of pine or fir cut to a particular size—3 inches thick, 9 inches broad, and of varying lengths; 120 "deals" go to a "hundred." A piece 7 inches wide is a batten. A plank is 11 inches wide, and a scantling is a piece or quantity cut for a particular purpose.

The chief value of fir or pine consists in the combination of lightness with strength, softness of texture, and ease in working with ordinary tools. These form, therefore, the principal materials of builders. Swedish timber is generally better than Norwegian for the purpose, usually being ripe and mellow, whilst the latter is apt to be hard and stringy.

For partition work, for sides, roof, and sometimes the floor, the best form of timber to use is that known as tongued and grooved; it enables the making of tight joints, and prevents a draughty interior. Useful sizes of matching, suitable for a good deal of the work of poultry house making, measure $\frac{5}{8}$ inch by $4\frac{1}{2}$ inches, and $\frac{3}{4}$ inch by $4\frac{1}{2}$ inches.

In the purchase of timber it is necessary to be sure that it is well seasoned, and to insure this no two pieces should have been lying together in the stack. It is also necessary to reject carefully all sapwood, large, loose, or dead knots, and any wood that is wet. Remember that it does not do to depend upon the reputation of well-known brands without examination. It usually pays to buy the wood cut to the required lengths; it is better to pay the small extra charge than to cut to waste, which is the fault of most amateur carpenters.

If required, not only may the timber be ordered by the scantling, but frames, doors, and windows, may be purchased ready-made. Exact measurements are necessary in all cases. Measure the length of joists, and their bearing, by scantling. For partitions, the length of head and sill, and the part in the walls, by scantling; height of doors and principal posts, also length of door heads, by scantling. For roofs, take the various entire lengths of the different positions. Allow in the measurements for the tenoning of frames, bevelling to rafters, and other cutting and waste.

Brickwork, Concrete, Ironmongery, etc.

In the erection of permanent houses, the use of bricks for building the foundations is very often necessary, whilst brick walls are advisable in the building of incubator houses or half-cellars. It is advisable to pay a little more for what are known as stock bricks, rather than to use place bricks—the former being selected, whilst the latter are not. To ascertain the required quantities, it may be noted that London stock bricks measure 8¾ inches, by 4¼ inches, by 2¾ inches; they average four courses to the foot in height when laid. North of England bricks are rather larger, and average 13½ inches to the four courses. In order to keep the walls dry a damp course of slates should be laid.

Mortar for laying bricks is made of the following ingredients: One part by measure of hard chalk lime to two parts of sand, the former being fresh and properly slaked. For concrete floor and flats one part of Portland cement should be mixed with two parts of sand and five parts of clinkers, broken bricks, or broken stones—these latter broken to a 2-inch gauge. The sand used in making either mortar or concrete must be sharp, and must not be salt. In the case of concrete the sand and cement are first mixed, thus making a mortar, to which the coarser material is added.

It is advisable that, as far as possible, all houses should be made in sections, so that when necessary they may be taken to pieces for removal. To facilitate such work,—the sections must be fastened together with bolts and screws; in no case should nails be used. It is further essential to use only such bolts as have square heads and sound threads, and the bolt holes should not be punched. See that the nuts fit properly, and do not screw them up too tight. Do not drive screws with a hammer. Wrought-iron screw bolts, nuts, and washers, are sold by the pound; and in size run from a length of 2 inches, and a diameter of ⅜ inch, upwards.

Corrugated iron sheets run from 6 to 8 feet long and from 2 to 3 feet wide. In roofing they overlap 6 inches, and should be double-riveted at the joints.

Asphalted roofing felt is made 32 inches wide and up to 35 yards in length, and ⅛ inch thick ; but "Stoniflex" roofing felt is 1 yard wide, in rolls of 15 yards.

Wire netting, largely used in the construction of modern poultry houses, is made in rolls of 50 and 100 yards, the mesh ranging from ⅜ inch—an inch mesh is rat and sparrow proof. The gauge indicates the size of the wire used, according to a recognized standard. Avoid an inferior gauge, and nettings in which there are only two twists to each mesh instead of three.

Construction of Houses.

It is unnecessary, and, indeed, impossible within the limits of space, to deal separately in detail with the several types of poultry houses in common use. But certain broad principles of construction are generally appliable.

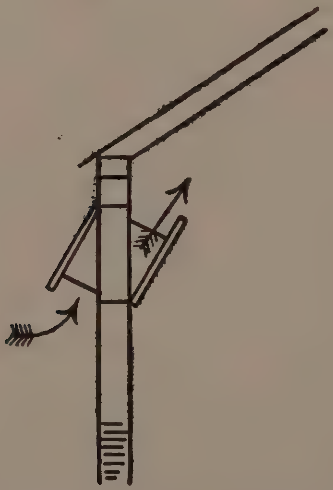


FIG. 14.—DOUBLE WINDOW FRESH-AIR INLET.

The amateur poultry house builder must decide upon the design and plan of the building that is best calculated to meet his requirements in the given circumstances, but in any case it must be remembered that health and hardiness are essential, and that neither draught nor the exclusion of fresh air will insure the maintenance of these necessary conditions in the stock. Due appreciation of these facts is illustrated in the catalogues of most of the reputable appliance makers, who recognize that the first requirement is adequate ventilation without draught Wire-netted fronts are now general, as also is the provision of shutters by means of which the amount of open space may be regulated to meet the needs of the moment.

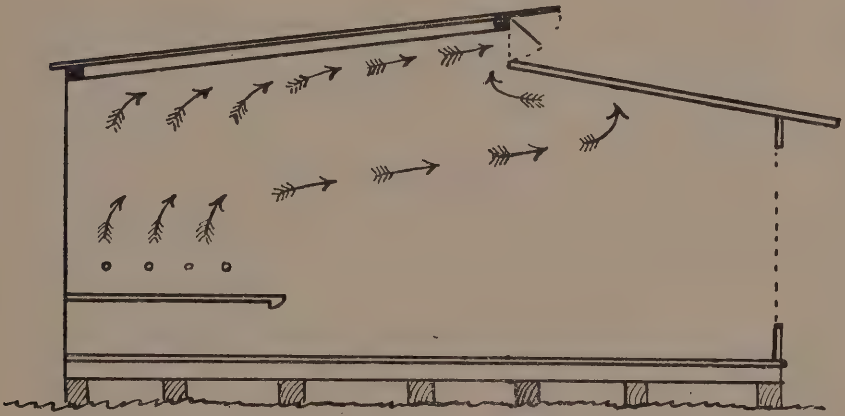


Fig. 15.—Showing the Ventilation of an Open-fronted Fowl House, with Outlet at Highest Point of Roof.

With reference to ventilation where artificial heat is used, as in brooding houses and incubator rooms or cellars, and the buildings are more closely shut up, it should be remembered that due allowance must be made for the greater exhaustion of oxygen consequent upon the presence of a lamp or lamps. One pound of oil will, in burning, consume the oxygen of 13 feet of air, and will also produce a considerable amount of water in vapour. Fresh air inlets, in a closed house, should be covered with wire-gauze, thus preventing a draught by diffusion.

If a house is to be a permanent fixture, a necessary preliminary to its construction is the preparation of the site. If on sloping ground it must be levelled, and if in a damp situation the house must be raised. But damp situations should be avoided, or the conditions improved by draining.

Floors.

The cheapest, strongest, and easiest form of floor to construct is the single-joisted floor. In the erection of a permanent structure, and in cases where it is not thought necessary to put in a concrete bottom, the joist ends should be laid upon timbers resting on the brick foundation, into which they should be built. But when a small movable house is made—unless it is to be set on wheels—the joists should be curved at the ends to serve as runners.

It is as a rule advisable, even in the case of comparatively small houses, to use joists of not less than 2 inches in width; if they are of a less width, there is a liability to split when the floor boards are being laid and nailed. It is economical, and therefore customary, to place joists on edge, the strength depending upon and varying with the breadth and square of the depth. Suitable measurements for joists used in the construction of stoutly built field houses would be 2½ inches by 3 inches; if they are to act as runners, they must be cut so as to project 6 inches beyond the floor at both ends of the house, whilst in any case sufficient length must be allowed for the carrying of the sides. Joists should be laid 1 foot apart.

It sometimes happens that the floor area is so large that the floor would be too big, as one section, for easy removal. It should, however, be made as one, but two joists should be placed only 1 inch apart at the centre, so that when made the floor boards can be cut through between the central joists, and the two resultant sections bolted together through them. A closer fit is thus insured than when a floor is made separately in two sections. Suitable flooring is $\frac{3}{4}$-inch by $4\frac{1}{2}$-inch matching, but ordinary floor boards will serve if necessary; each board must be fixed with two nails to each joist, the joints being made as tight as possible.

Framing—Ends and Sides.

In the construction of a permanent erection, the whole of the framework may be made and fixed before the matching is nailed on the sides and ends. But sectional houses are now the rule rather than the exception, and each section is made complete in itself, thus making it impossible to first finish the framing as a whole. Either way, however, the timber of the framing must be of sufficient dimensions for the purpose, relative to the size and type of house. For the sides, ends, and roof, it is preferable to use tongued and grooved matching; weather boarding is seldom used nowadays, on account of its tendency to warp. It is seldom possible to keep a house dry and draught-proof if weather boards are used. A narrow width of matching, say $4\frac{1}{2}$ inches, is the best, because it does not warp and shrink to any undesirable extent.

The various sections of a sectional house must be constructed with a view to their being subsequently bolted together at the angles; and the matching should be framed on 1½-inch by 3-inch frames. The framing is very commonly placed on the outside, in which case the horizontal pieces must be planed on the top at an angle which will prevent the retention of rain-water. Near the bottom of each section a piece of ¾ inch by 1½ inches should be fixed so that it rests upon the floor and allows a sufficient length of matching to drop below and protect the ends of the floor boards.

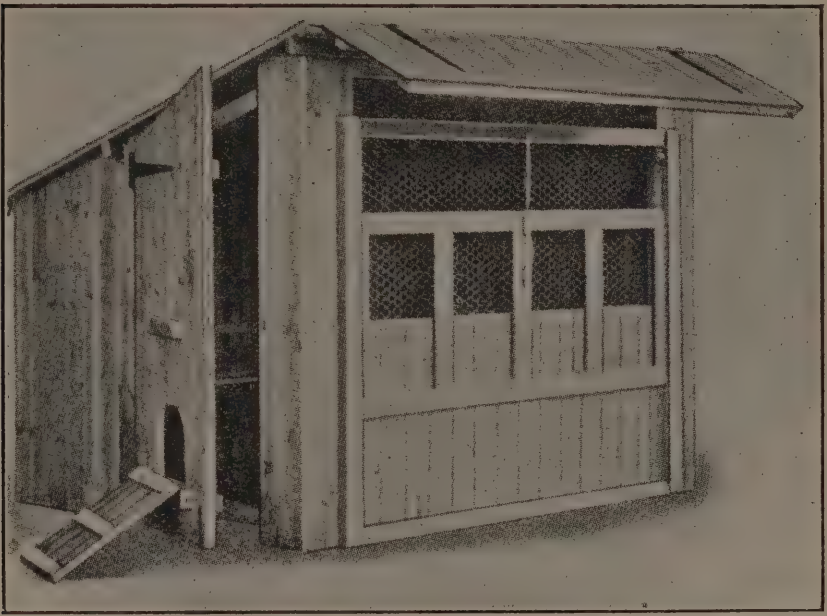


FIG. 16.—HOUSE FOR SMALL PEN OF LAYERS OR BREEDING STOCK.

(As made by Mr. B. E. W. Phipps.)

The framing of the two end sections must be made to support the roof timbers. To effect this a horizontal piece of 1½ inches by 4 inches is nailed to the inside of the matching to carry two pieces of 2 inches by 1½ inches—nailed to the matching and also to the horizontal piece—framed at the angle at which the roof is pitched. Notches are cut on the upper sides of this framing, into which the ends of the roof timbers are received. In the construction of these sections allowance must be made for door and window openings, remembering that the former must be large enough for the convenience of the attendant, and that the latter must provide for the admission of plenty of light. The position of the smaller openings for the use of the birds must also be considered, and the place for the nest boxes determined.

Roofs.

For the purposes of the poultry-keeper working under English climatic conditions, it is essential to construct the houses with roofs of a fairly steep pitch, in order to withstand the characteristic weather conditions. A usual and useful pitch is a third of the span. It is got at in the following manner: The span, or distance from front to back of the building, is measured and divided into three equal parts; at the centre of the span a perpendicular rod is set up, being equal in length to a third of the span; from the top of the rod to the extremities of the span will be the pitch.

Simplicity of construction is desirable; therefore the roof may be made of $\frac{5}{8}$-inch by $4\frac{1}{2}$-inch matching, nailed on pieces (" purlins ") of 2 inches by 3 inches—set 2 feet apart and running the length of the building. The ends of these pieces fit into the notched sockets on the inside framing of the end sections, as previously described. The joints of the matching follow the pitch of the roof, and the roof matching is cut to overlap the top of the side and end sections all round. The overlapping length is greater at the eaves, where, on the under-side of the roof, matching strips of wood should be nailed so that the roof fits tight down over the outside of the back and front walls like the lid of a box.

For the further support of the roof a ridge piece of 3 inches by 2 inches—made separate from and independent of the roof sections—should be fitted in notched sockets at the apex of the framing of the end wall sections; this supports the upper edges of the roof sections, and it must be made in one piece. Unusually long roofs necessitate a somewhat different construction, which need not be described in the present connection further than to say that, if more than one roof section on each side is required, overlapping and bolted ridge pieces may be used, supported by a central rafter resting in socketed side-brackets.

When the roof sections are in position, the whole must be bolted down to the upper framing of the sides and ends. A roof made of matching in the manner described should be felted, with the felt laid from end to end, beginning at the bottom, with each subsequent length overlapping. The felt is secured by superimposed slips of tarred wood (1½ inches by ⅝ inch) placed 2 feet apart and running from ridge to eaves; the ridge is then covered with a capping of wood or galvanized iron.

For the support of corrugated galvanized iron sheeting the construction consists of principals placed 10 feet apart, and purlins 4 feet apart. Permanent houses must be fitted with guttering and down pipes.

Doors and Windows.

In houses of ordinary type the door opening should measure about 5 feet 6 inches by 2 feet, but no smaller if convenience is to be considered. The door may be made of 4½-inch by ⅝-inch matching, nailed to three cross-pieces of 2¼ inches by 1½ inches, placed at top, bottom, and middle. A 2½-inch by ⅝-inch lining on the inside of the door opening, and also on the outside of the door itself, is needed to prevent draught when the door is closed. Such a door should be hung on three 6-inch cross-garnet hinges.

With regard to windows, the amateur will find that the sliding method of construction is at once simple and cheap, whilst there is no doubt that sliding windows are easier to regulate than others. For poultry houses of ordinary dimensions suitable windows should be about 2 feet long and 18 inches high, and such windows may be multiplied in larger structures, or the opening may be doubled in length; in the latter case the two frames meet at a centre bar, and the windows run right and left in their respective grooves. For frames grooved pieces of 2 inches by ⅝ inch, mitred and joined at the corners, may be used—glazed.

Grooved window frames of the above description should run in two rebated pieces (2 inches by 1¼ inches) fixed to the walls at top and bottom of opening. These pieces must, of course, be double the length of the window frames, to allow space for sliding back in opening. At the ends there must be stops to prevent the frames running out by accident. On the outside of the window openings ⅝-inch mesh wire netting should be fixed, and a light canvas-covered frame for use under adverse weather conditions, when the glazed frames are opened, will be found extremely useful.

Having dealt in what is probably sufficient detail with the general principles involved in the construction of fowl houses generally, the following notes are intended to indicate the main differences in the types used, according to the method of management adopted.

Methods and Types.

During recent years considerable progress has been made in systematizing poultry-keeping, and adapting the methods of management to the varied circumstances of poultry-keepers. Broadly speaking, three main methods of management are recognized and put in operation nowadays. They are all more or less modified to suit particular conditions, but it will be sufficient for the general purpose to refer to them briefly as the intensive, the semi-intensive, and the extensive methods, and to note the chief differences in the types of houses used.

Under the intensive method, accepting the term in its strictest sense, the birds are kept entirely in the confinement of the house. The semi-intensive system allows the partial use of open-air runs, in conjunction with the use of houses that provide accommodation for the keeping of the birds in close confinement when desirable. What may be called the extensive system involves the freedom of a good range, and practically confines the use of the house to roosting and laying.

To take them in the reverse order, the type of house that is most useful under extensive conditions—which are those of the farmer and others having the use of a good area of grass or arable land—is that which is commonly known as

The Colony House.

The farmer's fowls should live rent-free, if full advantage is taken of the value of the manurial product of the feathered stock. To allow fowls to remain in the vicinity of the farmyard, and in and around the buildings, not only deprives the land of a most valuable fertilizer, but tends to foul all the surroundings, with the consequent risks of insanitary conditions.

The most economical way for farmers and other occupiers of any considerable acreage is to house and run the birds on the colony system, under which they are divided into flocks and distributed all over the holding. Use is made in turn, according to season and the method of cultivation, of grassland, arable, and woodland. The manure is thus spread evenly over the land, the fowls have clean and fresh surroundings, and obtain to the full the advantages of such insect and vegetable food as the

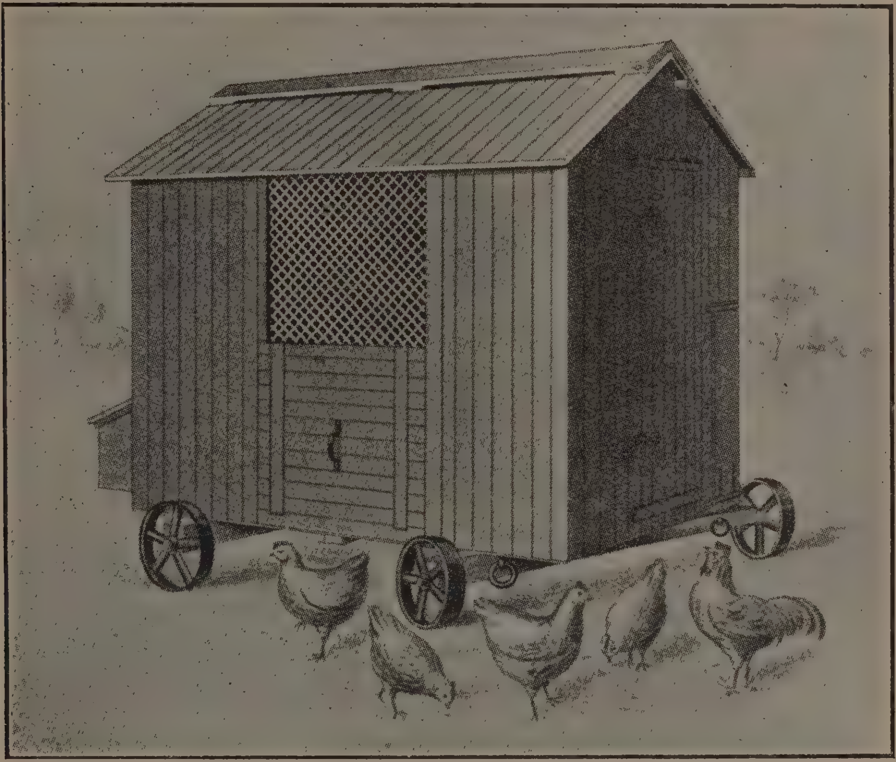


Fig. 17.—Colony Field House.

(As made by the En-Tont-Car Co., Ltd.)

situation affords. Under this system fowls cost less in food, and pay a relatively higher percentage than when kept in close confinement.

A colony house should be a good solid affair, but capable of easy removal. If made without floors, it is only necessary to move them frequently, in order to distribute the manure and avoid the necessity for much cleaning. They must be fitted with strong and broad wheels, and, if constructed upon the closed system, at least 10 cubic feet of air space per bird must be allowed.

Colony or field houses, as structures of this general type are very commonly termed, are made by most of the poultry house and appliance makers. Under a modification of this system of management, what are practically permanent houses are used in some cases, the house being removed at long intervals only; but the type of house that may be shifted to fresh ground frequently is preferable, as also is the constant removal. Colony or field houses are frequently made now with a good-sized wire-netted opening, the size of the opening being regulated by the use of glazed sliding windows. The fittings of such a house are simple, consisting merely of perches and nest boxes, the latter frequently being built on the outside, thus leaving the floor space free and enabling the poultry-keeper to collect the eggs without entering the house.

Semi-Intensive Houses.

The so-called semi-intensive system really includes two methods of housing. Some poultry-keepers use the large laying house, whilst others adhere to the small houses, but in either case the house is more or less suitable for the confinement of the birds under comfortable conditions when it is not considered desirable to allow them out in the run; or the use of the house and run is left to the choice of the birds. Anyway, the semi-intensive method involves access, either at certain periods or all the time, to outside runs in the open.

A house to be suitable for use under this system must be made to serve the several purposes of roosting, laying, and occupation during part of the day. It is in the latter provision that such a house differs from the more ordinary type of fowl house, because to meet the requirements it must afford ample and sufficiently lighted floor space to serve for scratching exercise.

The run space to be used in connection with the semi-intensive type of house should be about 20 square yards per bird, or about 240 birds to the acre; the total area should be divided into two runs, each for use alternately. In the type of semi-intensive house that is frequently used, the front is boarded up for a distance of 2 feet, with glass above and an open wire-netted portion at the top, the extent of the opening being regulated by the use of canvas-covered shutters.

Intensive Houses.

Intensive houses may be of practically any size, because they may be made to meet the needs of the poultryman who keeps no more than half a dozen laying fowls in the back-yard, or the requirements of those who keep large flocks for egg production upon a more commercial basis, housing them in the large modern type of laying houses. But inasmuch as the whole subject of intensivism in its strictest modern sense requires special and separate consideration, further reference to the houses employed will be made in a subsequent chapter devoted to the whole matter.

Coops and Hutches.

Coops.

In an unhealthily constructed coop, if disease is not immediately produced, the inmates are at least predisposed to the subsequent contraction of troublesome, if not fatal, complaints ; but quite hygienic coops may be made, with a minimum of labour and expense, by the utilization of many forms of packing-cases discarded by grocers —for a consideration. The most simple manner is to make the coop of any ordinary pattern, with wooden bars in front, but with the top, bottom, and sides, made draught-proof at the joints. Instead of a close wooden door, a frame covered with ½-inch wire netting (to keep out vermin), and canvas to prevent draught but allow a due exchange of air, is very effective. This provides the advantages of the open front, without risk or discomfort. To protect the front from the rain, either a projecting board may be fixed to the top, or, better still, a hinged shutter, the latter being hinged at the top, may be fixed at any angle by a simple contrivance, and made to serve as a shelter from the sun as well as from the wet. But in any case the open front, or the nearest approximation, is the ideal; the difference in the stamina of chickens thus cooped being very noticeable.

Hutches.

Even such a method of cooping as I have suggested must not be abused by overcrowding, and there comes a time when the chickens outgrow their earlier accommodation, and must be removed to more spacious quarters. A coop is then too small, but an ordinary roosting house is too large, and the intermediate stage requires the use of a type of hutch. There are, as a matter of fact, several types built more or less upon the open-fronted principle, fitted with shutters to regulate the size of the opening, and some so-called cockerel or bantam houses are very useful for growing chickens when they leave the care of the hen.

A hutch that gives very satisfactory results is that known as the "ark" in the chicken-rearing districts of the south-east; and although the construction is upon a different plan, it is a matter of experience that chickens are hardily and well reared in them. The "ark" is simply a long wooden hutch, stood on short legs, boarded all round, with a door at one side and a good pitch to the roof. At the apex at either end, under the projecting roofing boards, are openings for the escape of foul air, the fresh air entering through the barred bottom

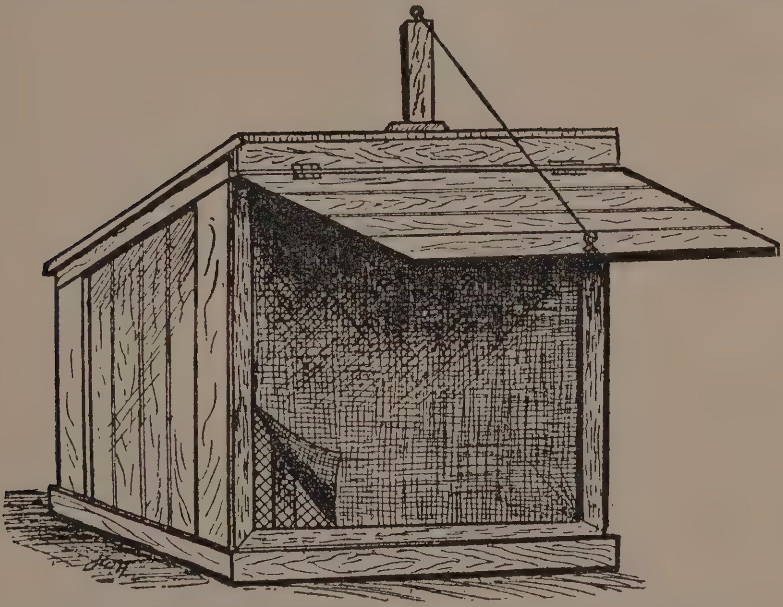


Fig. 18.—Chicken Coop with Wire and Canvas Front.

upon which the chickens rest, and through which the droppings pass straight on to the ground, the hutch being moved daily. Although the system of ventilation may appear to be crude, and even undesirable, the fact remains that it works well in practice, and is largely used by commercial rearers of chickens for market; but in the rearing of birds for stock purposes, it is preferable to house them in hutches built upon the open-fronted plan, such as I have already referred to, and which are to be found in the catalogues of advertisers.

CHAPTER VII

THE INTENSIVE SYSTEM

For egg production—Breeding and rearing not advisable—A sanitary system.

DURING recent years a method of keeping fowls in close confinement has been systematized under the name of the Intensive System. The term has been rather loosely applied, and as used by some has been made to include methods that are strictly speaking semi-intensive. For example, the chicken-rearing demonstrations that have been given in different parts of the country by Mr. F. G. Paynter, under the control of the Board of Agriculture and the County Councils immediately concerned, have been described in official documents as designed to show "a method of intensive" production. But, from the poultryman's point of view, we may assume that "the intensive system" is a phrase that is primarily and more correctly applied to the method of keeping fowls entirely in the confinement of houses specially designed for the purpose, and that it is a method that—as a consequence of that close confinement—involves the adoption of particular modes of management, calculated to maintain health and production under an extreme and artificial form of management.

Whatever else may be claimed for the intensive system

—and enthusiasts claim much—it is at least true that its methods are eminently suited to the special limitations of what is commonly described as "back-yard" poultry-keeping. As a matter of fact, back-yard poultry-keeping, so called, includes the keeping of fowls in small numbers upon small areas in a variety of circumstances, and under very limited conditions it is evident that the birds are better kept under the intensive system (if rightly applied) than under the more or less haphazard conditions that commonly prevailed in the past.

How far it is desirable, or economically advisable, to adopt the intensive system in circumstances that would allow the use of the semi-intensive or extensive systems is another matter, and one regarding which there is some difference of opinion. At the present stage of the development of poultry-keeping systems, it would seem that the more strictly commercial enterprises should not be attempted upon the extreme lines of intensivism until more has been proved, but should rather be along the lines of the semi-intensive system; whilst farmers and those who make other uses of considerable areas of land should adhere more nearly to extensive methods, leaving the general adoption of the actual intensive system to those who keep a few fowls in a garden or back-yard.

For the last-named the intensive system offers many advantages, as must be obvious to any observer who has noted the discomforts of the ordinary small fowl-run. The old-fashioned manner of keeping fowls in a garden run has by no means disappeared, as will be apparent to anyone who notes back premises of suburban and town houses, as viewed from the window of a railway carriage entering London or any other centre of population. A flimsy shed of rough construction, affording doubtful protection from wind, rain, and the other

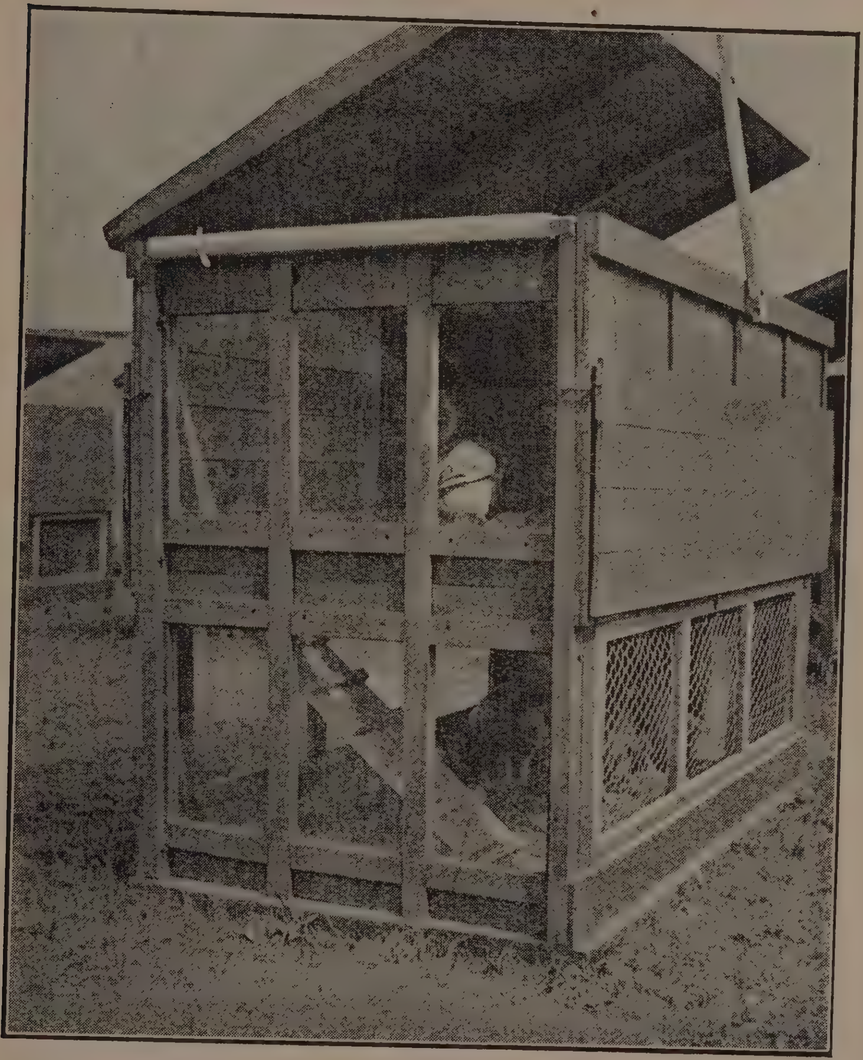


FIG. 19.—A BACKYARD INTENSIVE HOUSE.

discomforts of rough-and-ready carpentry; an uncovered run composed of mud or sodden cinders, and generally insanitary conditions; a few draggled and miserable-looking birds. Such is a by no means exaggerated description of the old-style "method" of poultry-keeping in and around our towns, and, in some cases, even in country places.

That the intensive system is a wonderful improvement upon such conditions cannot be gainsaid. It is a system under which the birds exist in comfort, whatever the weather conditions, and, if the management is good, they may be maintained in excellent health and good productive condition.

The first essential is absolute cleanliness, and whilst the labour required to insure this is a serious obstacle to the adoption of the system upon an extensive or commercial grade, it is so slight in the case of the small garden or back-yard pen that it is not a very serious consideration. In such circumstances there is no question of the cost of labour, and consequently no undue addition to the cost of production.

Nevertheless, as we shall see presently, the application of the system in the use of large laying houses is calculated—according to the arguments of some—to effect a saving of labour, which on the face of it is plausible enough, as far as it goes. Here, however, we are considering the semi-intensive rather than the intensive system proper.

For Egg Production.

The intensive system may be most commonly and successfully applied in connection with egg production where only a few fowls are kept. In any case, it would seem desirable to keep small flocks only under the strictly intensive system, because by so doing the risk of disease is lessened, and the results of an outbreak are limited.

Thus, if there is an outbreak of roup, it is most difficult to prevent its spread throughout a flock in a large laying house; and the consequences of such an outbreak may be serious where large numbers of fowls are kept for laying purposes upon a business basis. On the other hand, in the case of half a dozen hens kept intensively, the attention is much more individual. The symptoms of disease are quickly detected, and prompt measures—including, of course, removal and isolation—may prevent more than one or two birds contracting the complaint. Further, if all the birds suffer, the consequences are much less serious in a small flock than in a large one. This entirely apart from the fact that the amateur is much more likely to keep half a dozen fowls profitably than half a hundred, which is a big argument in favour of the small flock for the back-yard or suburban keeper of fowls on the intensive system.

The object of such small poultry-keepers is to produce eggs for use in their own homes, and for their purpose the intensive system is admirably suited. They only require a sufficient number of birds to utilize "waste" food from kitchen and garden economically. They need no male bird. Indeed, they are better off without one; they cannot breed successfully under such conditions, consequently the elimination of the cock reduces the cost of egg production and prevents a common cause of complaint.

If the suburban keeper of fowls on the intensive system starts with half a dozen pullets, it is to his advantage to induce a high egg yield. There is no risk of impairing their utility for breeding, because it is not to his advantage to undertake breeding and rearing in the circumstances. It suits his purpose to use the pullets as egg machines, and to replace his stock when he has got all the eggs that may be produced profitably under the conditions. As an alternative, his stock may be composed half of pullets and half of hens, in which case it would be necessary to replace half the total number of birds only each year. It may be remarked, by the way, for the benefit of small poultry-keepers, that, with such a few birds to dispose of annually, it is preferable—because it is generally more economical—to kill the fowls that are to be replaced and use them in the house. If such birds are simmered—*not boiled*—they will be quite tender for the table, where their food value will be greater than the price most dealers would be prepared to offer for them.

Breeding and Rearing not Advisable.

The keeper of a few fowls on the intensive system is not recommended to extend his operations to breeding and rearing; the effects of the system are not generally conducive to the attainment of the best results from the mating of birds kept in such close confinement.

It is much better to leave breeding and rearing to farmers and others who can command a more or less extensive grass range, such conditions making for hardiness and the maintenance of the required vitality and stamina. There are those who have bred from birds kept on the intensive system for one, two, or three years, but the writer has not yet found that the process has been continued in any one instance for a sufficient period to disprove the statement that it is preferable to breed and rear under more extensive conditions. That, however, is an aspect of the question which need not be further discussed. Suffice it to say that at the present stage of the development of the intensive system it is better to leave breeding and rearing to experts who feel that their experience is sufficient to justify the adoption of such a course. To recommend it to the inexperienced novice would be to advise that about which there is some doubt, and it is at any rate quite unnecessary in the case of the great majority of small intensive poultry-keepers.

The weight of evidence, so far, suggests that greater freedom makes breeding results more certain, and that better birds are likely to be grown and developed on the open field than in the few square feet of an intensive house, however perfect the arrangements and the methods of management. So far as the writer's experience and observation are concerned, he is content to recommend the use of the intensive system to small poultry-keepers who desire to produce eggs for their own table in the limited space afforded by a town back-yard or a suburban

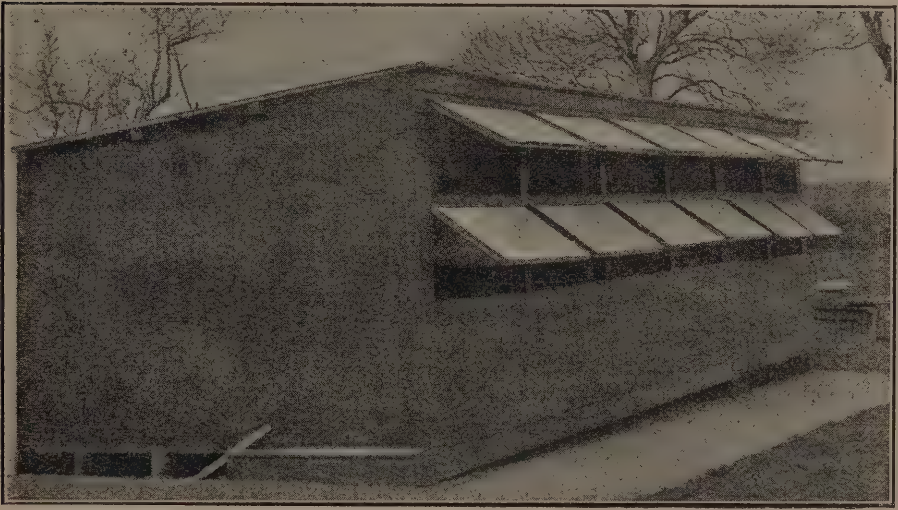


FIG. 20.—A LARGE LAYING HOUSE FOR INTENSIVE OR SEMI-INTENSIVE USE.

garden; but he does not advise breeding and rearing in such circumstances, and suggests that the periodical renewal of stock from outside sources is more economical for the purpose.

A Sanitary System.

Not the least of the advantages of the intensive system for the purpose we have in view is that it is sanitary, or at least that it should be if the management is not at fault.

Apart from the cock-crowing nuisance, which has caused so much avoidable trouble to back-yard and suburban poultry-keepers—and quite unnecessarily, inasmuch as the cock bird is not required in the circumstances—small poultry-keepers have been largely responsible for much of the opposition to poultry-keeping on the part of medical officers of health and urban authorities generally.

Not long ago a London official caused much discussion, which formed the basis of an article in *The Times*, by stating in court, relative to a case of alleged nuisance, that, as regards poultry-keepers in the area of his jurisdiction, he was "routing them out." It is presumable that his experience gave him some justification for his course of action and for his statement, but it may as reasonably be assumed that a general adoption of intensive methods would remove the cause of complaint, and lead the authorities to take a more favourable view of poultry-keeping, even in the great centres of population.

For, if the management of the intensive pen is correct, poultry-keeping under this system is quite unobjectionable to the neighbours, and sanitary as regards those to whose dwelling the fowls are kept in close proximity.

It has been disparagingly described as the "birdcage" method of poultry-keeping, but it may fairly be claimed that fowls that are properly kept in an intensive house are quite as harmless, from the sanitary point of view, as well-kept cage birds.

CHAPTER VIII

BREEDING AND INCUBATION

Proportion in mating—Natural incubation—The use of incubators—Preparation for incubation—Incubators.

Proportion in Mating.

THE common object in mating is to obtain a high percentage of fertile eggs capable of hatching a high percentage of vigorous full-sized progeny, and it is consequently important that the number of hens should be duly proportionate to the capabilities of the rooster relative to breed characteristics and the prevailing conditions. The breed factor is, broadly, influential in this matter in accordance with the average build and weight, the breeds falling into two main classes, and fewer hens of heavy build are mated with one male than would be allowable in the case of the lighter-built descriptions. Not only must breed be taken into consideration, but the age and condition of the birds have an important bearing upon proportion in mating, and in addition individuality —especially as regards the males—must not be overlooked. When due weight has been given to the several factors influencing the value of the numbers of the breeding pen, and consequently indicating suitable numbers, there still remain dominative externals that necessitate modifications. Chief amongst these are the period of the year, the character of the season, and the conditions of liberty or confinement to which the birds are subjected.

It is a matter of common experience that the results obtained from the use of too few hens in the breeding pen may be quite as undesirable as when the proportion is too great, but in utility breeding for the largest production it is the general object of the breeder to make the ratio as wide as is consistent with the attainment of a satisfactory hatching and rearing percentage. Nevertheless, so variable are the conditions and the combination of circumstances in individual cases that rules cannot be formulated for general application.

It is, for example, a moot point whether a wider mating ratio is advisable when comparatively large flocks are run at liberty in company with a number of males, than would be the usual practice when running a smaller number under equal conditions, but the common custom suggests that experience favours this course. The method of the farm breeder differs considerably in this direction from that of most others, and it is, at any rate, sufficiently evident that the number of hens to the male may be greater when a free range is available; but it is not clear as to how far such extended limits may be as satisfactorily increased in large flocks of multiple matings. In large flocks of this miscellaneous description it is not at all uncommon for the sexes to be in the proportion of fifteen to one, and sometimes this ratio is considerably exceeded with more or less success. More ordinary proportions for fowls that are run under conditions of comparative freedom are an average of ten or twelve hens of the light breeds, eight or ten of the medium weights, and six or eight of the heavy—to further extend the classification of weight and build. Generally speaking, it is found preferable to keep to the minimum in mating with cocks, and only to approach the maximum when a cockerel is mated, modifying the proportions in accordance with the period and the character of the season. In early spring the proportion of hens may be greater than in winter, and still further increased with the advance of spring; whilst for more particular objects than that of table chicken production a narrower ratio is often necessary. In cases where special mating requires a more rigid selection and a further narrowing of the ratio, the service of the male may be alternated, a second pen of less closely selected hens being used for the purpose of maintaining a suitable breeding condition, thus preventing the undesirable results that follow disproportion in mating.

With other domesticated birds the same general influences are more or less operative, subject to differences of habit. There are duck breeders who fix the mating ratio at one to two or two to five, but in breeding for the production of table ducklings it is by no means unusual, in favourable circumstances, to mate the birds in the proportion of one to five early in the season, and to add more ducks as the weather conditions become more favourable. But with ducks, as with ordinary domestic fowls, the climate is an important factor, and reports of practices in other countries are not always safe guides for those differently situated. Generally speaking, three or four ducks mated with a drake will give good results under average English farm conditions. In the matter of geese, the very limited requirements of the great majority of breeders in this country do not encourage any undue widening of the mating ratio, the very small number of two geese to a gander giving very satisfactory results as a rule, although in most cases the proportion may be increased to three to one if desired. These birds are, however, comparatively slow to reach a maturity suitable for reliable breeding purposes, and should not be mated too young. Common domestic fowls and ducks do not long retain full breeding vigour, and, as a rule, their utility is considerably impaired in this respect after their second year; but from that age geese remain good breeders for a decade or more. With turkeys, again, the use of young breeding stock is in many ways undesirable, the older birds being much more reliable. The practice of sending hen turkeys to stud is not so satisfactory as is sometimes claimed, because, whatever the duration of the influence of the one service, a more vigorous progeny results from a permanent mating. In the matter of proportion in mating there is considerable variation in the methods of breeders. As a rule, from six to eight hens may be considered suitable, with ten as a relatively safe limit; but the ordinary breeder can usually get all the young birds he has need for from four or five hens—and experience shows that such a proportion is commonly successful. Large flocks are sometimes mated with two stags, which are run with the hens alternately, but it is preferable, if possible, to mate the smaller numbers suggested permanently.

Natural Incubation.

Although we speak of chickens hatched by a hen in a hand-made nest as being naturally incubated, it is well to remember that the general conditions of production under domestication are *ipso facto* very largely artificial; and it may be noted that the methods employed are of necessity in some particulars farther removed from the natural in proportion to the unseasonableness of the period. Nevertheless, there are reasonable limits, which are in some instances unnecessarily transgressed, even in the pursuance of the so-called natural method. It may, of course, be argued that the following of Nature is not always conducive to success in the treatment of fowls in captivity, in view of the modifications of domestication; but, on the other hand, an approach to the natural is in some particulars more essential, and notably in the case of incubation. In the development of egg-producing or table qualities there is a legitimate scope for what may be regarded (from an economic point of view) as an improvement upon the normal course of Nature, but in the matter of incubation—whether it be really natural, semi-natural, or avowedly artificial—there are certain factors that do not allow much latitude or deviation from the normal in any process of operation. An imitation or reproduction of certain natural conditions is essential to the success of the artificial.

Seasonable incubation is in any case more natural; good results are consequently easier of attainment, and the financial returns are correspondingly low. Unseasonable incubation is, under any circumstances, more or less unnatural; good results are only secured with difficulty, and their marketable value is therefore enhanced, although they are by no means also relatively remunerative to the producer. The suitability of the egg for winter hatching involves considerations of stock, ancestry, mating, and management, outside the present purpose, which concerns the suitability and management of the sitting hen for unseasonable incubation.

Persistence and reliability, as well as the incubating inclination out of the natural season, are primary factors;

and in these particulars some races of fowls are much more adaptable than others, such characteristics being doubtless the result of long development by selection and use for a particular purpose. In this connection, and relative to the chicken industry of the south-east, it was noted in a Government report of 1895 that the hens of the district exhibit "an accommodating propensity to sit early and often . . . the undoubted adaptability of the fowls of this district to its particular ends may be the effect and not the cause of the attention given to their rearing and breeding." I would hazard the opinion that this is a fact, and not a supposition, just as, on the other hand, the relief from the necessity for natural incubation (by the refusal of the opportunity) tends by disuse to the loss of the inclination, and in course of time the hen forgets her maternal instincts—hence the so-called non-sitting breeds. It is noteworthy that in Egypt, where artificial hatching is still practised, as it has been continuously for many centuries, the native fowl has practically abandoned the habit originally implanted by Nature.

In the production of early chickens experience usually results in a preference for the use of the hen (the incubator in such cases being regarded as auxiliary), and it is necessary for the purpose to use hens of a race in which the incubating habit has been strongly developed, otherwise broodiness may be too long postponed or uncertain of duration; and there is need for considerable discrimination in their management at an unseasonable period. The materials used in nest-making, the method of construction, and its situation, involve details having important bearing upon results. The form of nest box is relatively unimportant, provided ventilation is secured without draught; but earth should form the foundation material—either the loose soil or a turf—with a sufficient but not too thick lining of soft hay, the whole shaped as a shallow hollow. At a later period it is preferable to place the nest boxes out of doors, if they are thoroughly rainproof; but in the early months the discomforts are not only too great, but the climatic changes make the shelter of a dry and reasonably warm shed necessary to the progress of the incubating process. In any case the nest boxes must be beyond the direct influence of cold winds and frost, both when the hen is covering her eggs and when she is off the nest for the purpose of feeding and taking necessary exercise.

The maintenance of a suitable incubating condition in the hen at an unseasonable time of the year is a matter involving adequate consideration; the greater the discomfort from climatic causes, the greater the need for the regulation of the dietary to meet the demands for the necessary temperature of the incubating body. Relative to temperature in natural incubation, it is not, perhaps, generally known that the degree of heat imparted by the sitting hen varies during the incubating period, decreasing slightly from the first week onwards; so that there is sometimes a difference of about 3 degrees between the beginning and the end, the temperature of the eggs showing a gradual increase at successive periods, and an equal balance being maintained with the heating body. This fact suggests that there is more reason for the methodical treatment of sitting hens, as regards the returning of each to her own nest after feeding, than is otherwise apparent; but in any case the system of tethering at feeding time, as practised by gamekeepers, either when the nest boxes are under cover or in the open, is one to be commended to poultrymen whose production is at all excessive. To get a chicken out of every egg capable of yielding one, it is necessary to study details and work methodically, and by the adoption of the plan indicated the hens are properly cared for under due control, the time occupied in the work is reduced, and the eggs give the best results.

The Use of Incubators.

The practical value of incubators as auxiliaries to sitting hens, and the distribution of the artificially hatched chickens among those naturally incubated—for rearing by hens—is increasingly admitted by those who have taken the trouble to understand the operation of the machines; and most of the dissatisfaction expressed by chicken-rearing farmers of my acquaintance has upon investigation proved to be due to a disinclination to devote the same intelligent attention to the working of incubators that is so readily given to reapers and binders and the other intricate machinery of modern agriculture. The proportional importance of the poultry production may be small, but, if chicken-rearing is undertaken at all upon a commercial basis, it is uneconomical to ignore or despise such practical adjuncts at seasons when the natural disinclination to broodiness renders the output small and increases value.

It may be suggested that, as a hen can more successfully rear a moderate than a large brood of chickens at unfavourable seasons, it is unwise to add to her responsibilities by the addition of those artificially incubated; but there is less force in this contention than appears on the face of it. Whatever may be theoretically assumed, it is a fact that, under existing methods of management and the limitations of the season, the proportion of fertile eggs is comparatively low in winter, and that the average production falls far short of the number set; and it is, moreover, a matter of experience that the vitality of the birds hatched bears some relation to the hatching percentage. Consequently, a hen in her second week of winter rearing is usually wasting a considerable proportion of her brooding capacity (which in a large barndoor hen is greater than is often supposed), unless, as frequently happens where normal broods are observed, the chickens have been bulked under half the original number of hens, the mothering energy of the others being lost by their rejection at a season when its value is greatest.

It is commonly thought that the use of an incubator necessitates the subsequent use of a foster-mother, but in ordinary practice this is entirely unnecessary if the size of the incubator is proportionate to the average number of hens usually sitting at the season of its employment, and this may easily be determined by individual experience. It is probable that in the majority of cases of farm production there would seldom be any surplus chickens consequent upon the use of a 100-egg incubator coincidently with ten or a dozen large sitting hens. It may be admitted that there are instances of exceptional management resulting in a higher winter hatching percentage and improved stamina in the chickens, but I am specially referring to the consequences of ordinary conditions; and there is nothing very extraordinary to be said regarding the circumstances of most of those producers whose aggregate production supplies our markets, and even the best results leave some opportunity for the use of incubators.

In the matter of the reasonably successful use of these machines there is no inherent difficulty if the principles of their operation are sufficiently understood and the plain directions of the makers carefully followed. So considerable have been the improvements made during recent years that the most successful operators of incubators are probably those who leave them alone to do their own work, except for the necessary morning and evening attention.

Preparation for Incubation.

Good incubators are obtainable nowadays at quite reasonable prices, but, inasmuch as success depends largely upon the excellence of the material and the workmanship, cheap machines are to be avoided; any considerable reduction from the general average of the leading makers can only be made at the expense of efficiency. As regards size, amateurs very commonly commence with an incubator of extremely limited capacity; and although such a machine may be sufficient for the needs of some, it is an economic mistake to purchase one for trial purposes where there is a possibility of it proving too small for the hatching requirements. The initial cost of a machine of moderate capacity compares favourably with that of the smaller ones, whilst the subsequent cost of oil and labour is not very materially increased. The chief difference in the operating expenses is in the consumption of fuel, and it should be noted that it is always more economical to operate one large incubator than two small ones of united equal capacity.

Relative to location, it must be remembered that no incubator will give equally good results in every situation, and the failure to recognize this fact has caused many to condemn artificial methods of hatching without giving their machine a fair trial. It is true that they may be worked with more or less success in a variety of circumstances, but the immediate surroundings must be propitious. The place used as an incubator chamber may be a cellar, an outbuilding, or a room in a dwelling-house, but there must be a certain set of favourable conditions to produce a prosperous termination of the operations. The proper balancing of temperature, moisture, and ventilation, is not equally possible in all situations. The structure must be sufficiently stable to minimize any possible vibration, whilst the necessity for a continuous renewal of air, the elimination of draught, the maintenance of normal humidity, and an approach to a uniform temperature, are matters of the first importance. It is difficult to approximate to uniformity in the temperature of the incubator chamber; but whilst the room used for the purpose should be chosen because of its possibilities in this direction, the trouble may be met by making the supplied heat within the incubator and the external atmospheric conditions balance one another within comparatively narrow limits. For example, a machine temperature of 104° would be suitable in a room temperature of 60°, whilst a rise of 10° in the latter would be adequately met by a decrease to 103° in the egg drawer. Ventilation is another important consideration, and this must be arranged by methods that prevent the action of a direct draught in the immediate vicinity of the incubator; but there must be a sufficient expulsion of foul air and admission of fresh if the development of the embryos within the machines is to be properly maintained.

Before putting eggs into an incubator that has been newly set up, every detail of the working should be in order and the machine running at a level temperature. It is better when first starting an incubator, or when working one for the first time in a new location, to make a trial run for two or three days with empty egg trays, until the manipulation of the regulator is thoroughly understood and a desirable temperature is found to be easily maintained.

Incubators.

It is, of course, a matter of very general knowledge that artificial incubation of a sort has been practised from time immemorial. Old civilizations have practised the art with limited scientific knowledge, and ruder peoples have learnt by observation to utilize mounds of decaying vegetation for the same purpose. The possibilities of the heat generated in a fully stocked bee-hive have been discovered, and thermal waters have been applied to the same end. The ancient Egyptians were adepts at the work, and the Chinese practise to this day the transmitted knowledge of the centuries. Nevertheless, although their methods have been crude, their reputed success has been considerable, depending, no doubt, very largely upon the patient perseverance of the operators, who in some circumstances of incubation constituted themselves living thermometers of structures devoid of any adequate equivalent of modern mechanical regulating devices. There does not, however, appear to be any very reliable information regarding their average hatching percentages, so that, although the work has been materially simplified by recent inventions, we have no available means of satisfactorily determining the comparative results, and of ascertaining the measure of advance—if any—in that direction.

Opinions are not unnaturally divided among operators regarding the merits or demerits of the principles as applied in the two modern types of incubators, but my own experience has led me to the practical conclusion that there is no very material difference in the attainable results, an opinion which has been largely supported by other practical users of both types, as well as by the tests of experimentalists. Whatever difference, if any, may exist in possible hatching percentages, it is evident that it is so slight as to leave the choice between the two an open question for the decision of the individual.

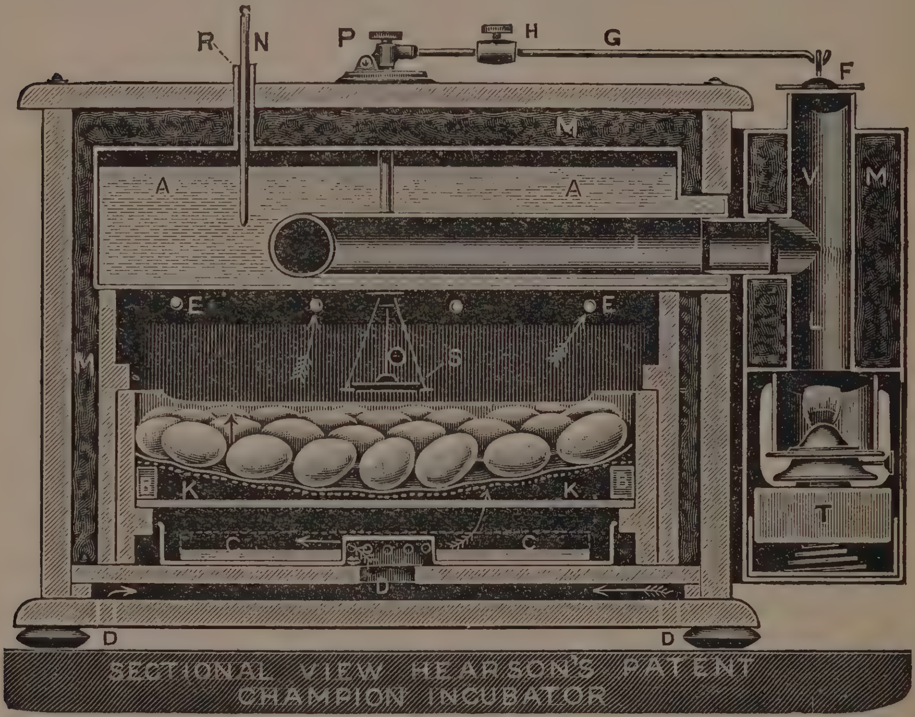


FIG. 21.—SECTIONAL VIEW OF HEARSON'S INCUBATOR.

(By courtesy of Spratt's Patent, Ltd.)

For the practical purpose of production Mr. C. E. Hearson was the pioneer, in his introduction, some quarter of a century ago, of the incubator known by his name; and as his is what is colloquially known as a tank or hot-water machine, it will fittingly serve to illustrate the type, of which it may well claim to be the modern original, the principles and working details of which are shown in the accompanying sectional diagram (Fig. 21). In the upper part of the machine is a water tank, *AA*, through which is a pipe, *LL*, entering directly from the lamp flue, and in the actual machine returning through the tank, although that portion is not shown in the drawing. The upper end of the vertical flue *V* is closed with a plate or damper, *F*, suspended from a lever, *G*, which prevents any escape of heat unless (when the heat is in excess of the requirements) it is automatically raised, and the internal temperature lowered in consequence.

So all-important is this automatic regulation of the temperature in the egg drawer that the method of securing it demands some special attention. The lever *G* with the suspended damper is raised or lowered through the action of a metal rod, *O*, the lower extremity of which rests upon the centre of a metal capsule, *S*. Within the capsule is a liquid which boils at a temperature slightly lower than that which it is necessary to maintain in the egg drawer; and as soon as the liquid is vaporized the metal sides are distended, and, forcing up the rod, raise the lever and the damper, the sides again contracting with the subsequent reduction of heat, and, the damper being lowered, the required balance is maintained.

In Mr. W. Tamlin's incubator, which is of somewhat similar construction, though differing in detail, the capsule of the automatic regulator is protected from the disturbing factor of direct radiation from the tank by means of a conical non-conducting shield, which, with the whole construction of the regulator, is shown in Fig. 22. The other details in the sectional diagram include *BB*, the movable egg tray; *CC*, water tray; *DDD*, fresh air inlets; *EE*, ventilating holes; *MMM*, non-conducting packing material; *N*, tank thermometer;

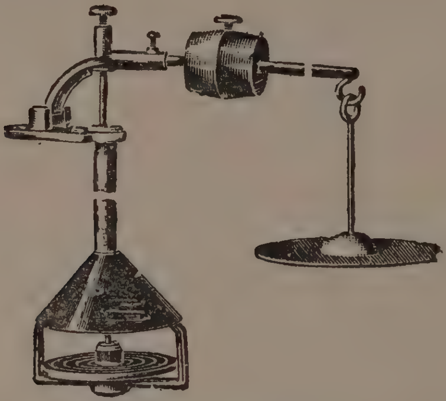


FIG. 22.—AUTOMATIC REGULATOR AS ATTACHED TO TAMLIN'S INCUBATOR.

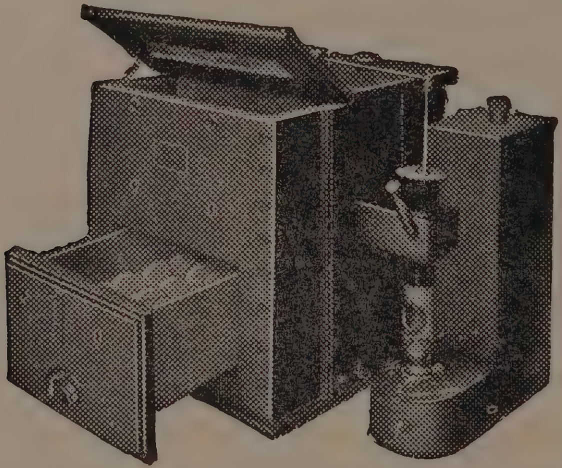


FIG. 23.—TAMLIN'S INCUBATOR WITH SELF-FILLING LAMP.

and the remainder of the construction is obvious. Relative to heating apparatus, Fig. 23 illustrates the automatic self-supplying lamp as attached to the Tamlin incubator,

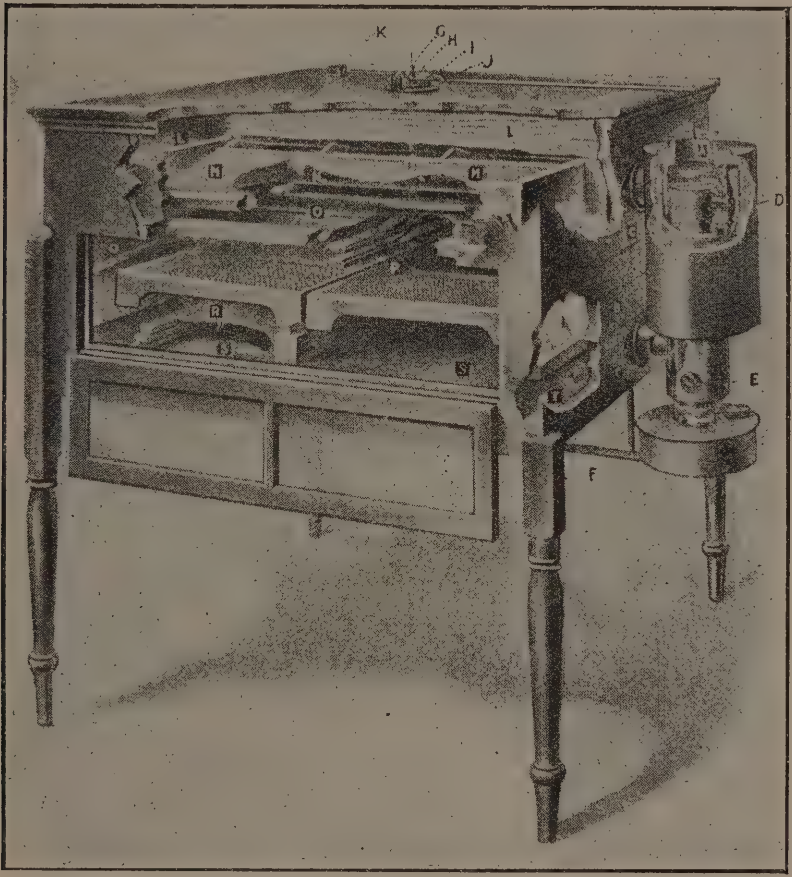


FIG. 24.—SECTIONAL VIEW OF CYPHERS INCUBATOR.

in which the burner reservoir is automatically supplied from a container holding sufficient oil to work the machine for three or four weeks.

Fig. 24 is a sectional view of the Cyphers incubator, an American invention embodying the alternative method of directly heated air and the application of another mode of regulation. In this machine porous diaphragms (*O* and *R*) compose the upper and lower divisions of the egg chamber, and the heating apparatus is so arranged that the lamp fumes or carbonated air cannot gain access to this chamber, but warmed, pure air is diffused through the diaphragms, and thus supplies the requisite degree of temperature for incubation, the eggs being placed in the trays immediately below the letter *P*. It is unnecessary to the present general purpose to further describe the construction in its several details, the main principle of the system depending upon the even distribution of warm, pure air, which is slowly forced down into the egg chamber through a closely woven fabric, and is thence diffused through the lower diaphragm,

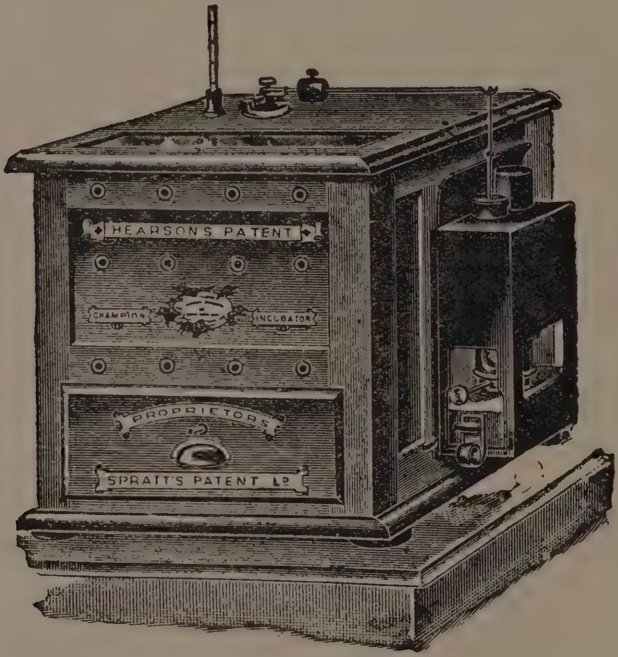


FIG. 25.—HEARSON'S INCUBATOR.

drawn through the exhaust pipe at the bottom of the heater, and discharged.

The remaining point to which attention may be drawn is the method of regulation, in which the expansion of a combination of metals of unequal expansibility is depended upon for the control of the lever action in raising the damper above the flue. The thermostat is composed of strips of steel riveted at the ends to strips of zinc, and, as the zinc expands more than the steel, its movement (under the influence of a high degree of temperature) is directed to the centre; the increased length bows, and, acting upon the connecting rod resting upon its centre, raises the damper. A portion of

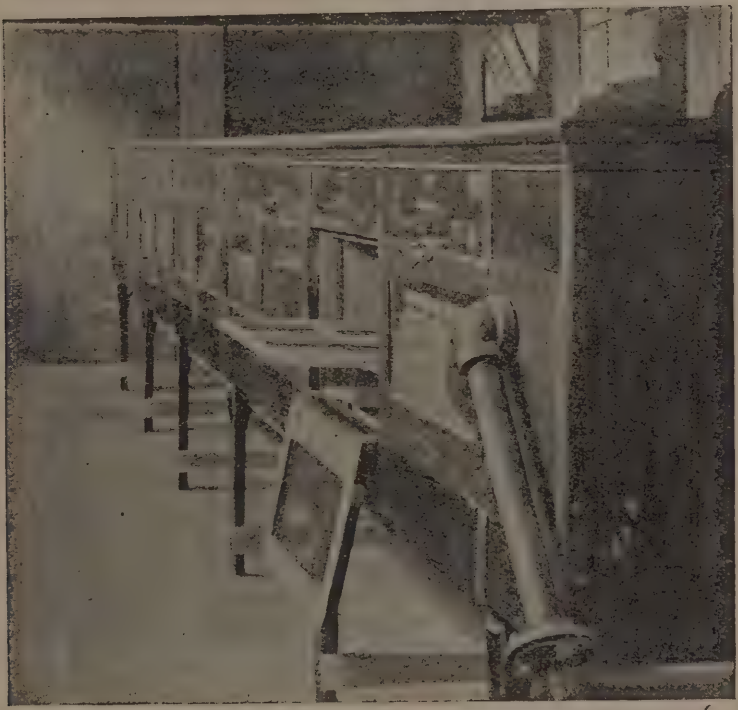


Fig. 26.—A Mammoth Incubator.

the thermostat is shown in the illustration immediately over the letter *P*, the connecting rod running up to *G*, and the damper at the end of the lever being suspended over *A* in the heater.

There are, of course, many other details of interest and importance in the various makes of the two types, but the above brief descriptions are perhaps sufficient to give a general idea of the principles involved, and the two main lines upon which they are applied for practical purposes.

CHAPTER IX

BROODING AND REARING

Brooding—Rearing chickens artificially—Heated brooders—Fireless brooders.

Brooding.

THE natural mother is still the best brooder, despite the rather extravagant claims that are sometimes made regarding the artificial means that are now so largely employed. That in certain circumstances, such as now very largely prevail, the mechanical brooder is the necessary complement of the hatching machine must be allowed, but it is undesirable to over-estimate the powers of appliances that should be considered rather as adjuncts than substitutes. The particular requirements of the season serve to accentuate their advantages during these early months, but perhaps the majority of practical rearers would admit a preference for the hen. That it is essential to refer more especially to artificial than natural methods of brooding at this time is due to the fact that foster-mothers are available when hens are not —at any rate, in sufficient numbers to meet the needs of many of those who wish to rear in advance of the more natural rearing periods.

Fowls vary considerably in respect of brooding and the season in which they are available for the purpose, the difference being partly due to breed characteristics and partly to the influence to which strains or families may have been subjected. For this reason, among others, a change of object in breeding a given breed is often very undesirable. For example, the Light Sussex—a variety of the type of fowl so long bred in the south-east for the production of table chickens — is now being very commonly developed for egg production. As one result of selection for this one purpose the broody habits have undoubtedly undergone some modification. From the point of view of those who desire to develop the laying powers of the Light Sussex this is, of course, desirable, but it should be remembered that the relatively frequent broodiness of the old stock was one of its advantageous characters—according to the earlier purpose. However, those whose early chicken-rearing needs are moderate may by the use of birds of a suitable breed and strain usually rely upon natural brooding. But even the hen, good mother as she may be, requires the assistance of good management to accomplish successful brooding at this season. She and her brood must be comfortably cooped in a sheltered position, remembering that, although the open-air method is conducive to hardiness and the maintenance of health in the young, there is no necessity to risk the results of undue exposure. Under all ordinary conditions the best run is on closely cropped turf on a medium or light and well-drained soil. Healthy young birds, the progeny of constitutionally sound stock, will not suffer much from wintry weather—unless the conditions be very severe, when extra precautions should be taken—provided they are not unnecessarily exposed and that the interior of the coop is dry and comfortable. The hen is generally a good judge of the time to brood them and the time to turn them out, and as a rule she will perform her duties properly if her own needs are carefully considered. Above all things, she must be well fed for the maintenance of bodily heat, and may very well be allowed some maize when brooding in winter. The coop should be roomy—30 inches square is not too large—the comfort of the chicks depending largely upon a sufficiency of floor space and plenty of fresh air at night.

When hens are not available in sufficient numbers, and the incubator is brought into use, the brooding appliance is the necessary adjunct. How far the fireless or unheated brooder is adaptable to winter conditions does not appear to be sufficiently determined to justify a general recommendation of the method at this stage, and until more definite conclusions have been reached it is unlikely that the majority of rearers will abandon the heated brooder. In the use of the latter, however, the beginner is very liable to overheat and under-ventilate, thus not only directly encouraging disease, but discouraging the use of the open run. Unless the conditions are very carefully adjusted, chicks that are artificially brooded are prone to remain in the warm compartment when they should be exercising in the fresh air outside—either under cover in an open-fronted section of the brooder, or right outside in the open. That there is no hen to stand up periodically and compel exercise is one of the unavoidable defects of the machine, but careful management will do much to overcome the difficulty by keeping the temperature as low as is consistent with the needs, and by insuring a constant and sufficient supply of fresh air. It is not possible to give a standard brooding temperature that will apply generally, because so much depends upon circumstances, including the type of brooder construction, the method of heat-supply, the position of the thermometer relative to that of the birds, as well as the requirement for some adjustment in accordance with prevailing external conditions. In this particular the directions of the maker may usually be followed, with such modifications as may be directed by common sense and experience. But in any case, whatever the commencing temperature, the aim should be to reduce it gradually but persistently. The observant operator will find in the behaviour and condition of the birds the best indications of the suitability or otherwise of his regulation of temperature. Overheating is fatal, but a sufficient warmth at the commencement is as essential as its subsequent reduction; and it should be recognized that overheating is often caused by overcrowding.

As in the case of the cooped hen and brood, the brooding appliance and its occupants must be suitably placed with a view to encouraging the use of the open run, this and other reasons tending to make the brooder of moderate size more useful than larger and more permanent constructions. It is, moreover, preferable to brood a large number of chickens in several small colonies than to adopt mass methods of brooding, and to bear in mind that it is desirable in practice to halve the advertised capacity of artificial brooding appliances.

Rearing Chickens Artificially.

The novice is perhaps more often the cause of failure than is the machine he operates, and most initial efforts are ruined by an excess of sympathy, resulting in the overheating of the brooder, and the consequent weakening, and probable death, of the chickens committed to its mechanical care.

It is during the first ten days, or a fortnight, that most of the fatal mistakes are made, because, although overheating is dangerous, an insufficiency of heat at the commencement is also inimical, and the finding of the correct temperature at the start and its gradual and sufficient subsequent reduction are among the most severe tests of skill in connection with artificial rearing. Although a registered temperature of from about 85° to 90° among and around the chickens may be theoretically suitable at the beginning, it is much more satisfactory to judge the correctness of the initial temperature from the appearance of the birds, the question of the correct degree being largely dominated by the construction of the brooder and the external atmospheric conditions. A very successful and extensive user of outdoor lamp-brooding appliances, with twenty-five years' practical experience, states that as a general rule the operator should watch the chicks when he first puts them under the brooder, and bring the temperature up "till they flatten out," and when that temperature is reached it is the correct brooding temperature.

Remembering the atmospheric conditions of incubation from which the chicks are immediately transferred, there is a great deal to be said for that statement, although its formulation as a rule for general application is perhaps ill-advised in view of the various, and often opposite, circumstances of operation. The behaviour indicated is that observable when the newly hatched birds are comfortable, and, not being hungry, are quite content to lie flat and enjoy the agreeable warmth; and in the occupation of a brooder with a curtained hover they will often lie in that position, with their bodies within the curtain and their heads outside, or nearly so. Provided there is no panting or sign of respiratory distress, such behaviour is consistent with conditions of heating approximating to natural brooding. Assuming that the temperature of the air immediately surrounding the chicks, within the hover or warmest comparment, averages from 85° to 90°—as would ordinarily be the case—it may safely be maintained at the maximum for the first day or two, decreasing to the minimum (or in favourable weather still lower) by the end of the first week, the temperature being thence still further and gradually lowered, until it reaches about 70° during the third week. As the season progresses, more rapidly achieved modifications will be necessary, but at all periods and at all seasons and changes the aim must be to strike the mean between overheating the birds and starving them with cold. In the endeavour to avoid overheating it must not be forgotten that heat is not only beneficial, but essential, and the exact degree necessary in individual cases must be left to the judgment of the operator.

Although there exists the need for the required degree of temperature within, the birds must not be debarred from fresh-air conditions. The outdoor method should always as far as possible be adopted. It is not merely safe, but beneficial, so long as the birds are only subjected to a dry cold, even in frosty weather; but in conditions of rain, snow, or cutting winds, the brooder may be more satisfactorily worked within an open-fronted shelter, having a sound roof and firm, dry floor, with free access to the grass beyond. Any method of absolute indoor rearing or close confinement to a shed not only entails more direct and constant attention, but the subsequent management is rendered increasingly difficult, and the ultimate results are uncertain and usually unsatisfactory for the general purpose of English poultry rearers. I think there is very little doubt that the prevalence of leg troubles and other disorders among young chickens in winter is partly due to close confinement and an insufficiency of fresh air, and that an open-air method, as far as such treatment is consistent with our variable climate, tends to ultimate gain.

Early in the season, the nights being long in proportion to the days, it is necessary to feed as early and as late as possible, and whatever method of feeding is adopted—whether dry, soft, or a combination of the two—green food must in no case be omitted, even when the birds are running on grass, and in many circumstances a small allowance of meat is beneficial. The latter item is neglected by some of the most practical rearers, who, however, in many cases supply milk for drinking purposes in addition to a well-balanced food ration.

Heated Brooders.

Following the use of manure heaps to supply heat to brooding appliances of primitive construction, successive devices have been employed with more or less success, and (as in the case of incubators) the most practical have been heated either by means of hot-water tanks or heated air.

I suppose the crudest form of foster-mother that may lay claim to inclusion in this category is that in which a lamp of the "hurricane" type is set in the midst of the chicken chamber, surrounded by a wire guard, and surmounted by a metal radiator. I have made such an appliance myself, and although I must admit some success in its use, which may have been due to chance, or to the additional attention accorded an experiment, I should hesitate to recommend for practical purposes a method so opposed to a better knowledge of brooding requirements. Not only is the distribution of heat necessarily very unequal, and in some circumstances quite inadequate, but there is the more serious and insuperable objection of the presence of lamp fumes, and the concurrent consumption by the burning oil of a considerable percentage of the oxygen present in the brooding chamber, of which the chickens are consequently deprived.

Any system that does not absolutely separate the heating lamp from the chicken chamber, and insure the direct passage into the open air of the lamp fumes and vitiated atmosphere, is defective. The extent to which success is otherwise endangered is in a large measure in proportion to the quantity of oil consumed in relation to the air space, 1 pound of oil in burning appropriating the oxygen of some 13 feet of air, and giving off a considerable quantity of carbonic acid and watery vapour. No suitable system of ventilation can adequately rectify such a condition of affairs within the brooding chamber, without coincidently dispersing the already insufficient supply of heat, and in all probability producing very undesirable air currents.

It is essential to the health of the chickens and their due growth and development that they shall not only experience a sufficient degree of warmth, as evenly distributed as possible (otherwise they will be crowding and trampling), but that the supply of atmospheric air within the brooding chamber shall be fresh and pure, and constantly renewed without direct draught. It is also desirable to avoid, as far as possible, any excess of bottom heat. These conditions are attainable with some considerable measure of success in many of the appliances at present within reach of the ordinary poultry breeder, and the methods most commonly employed for the application of hot air in brooding are very well exemplified in the accompanying sectional illustrations of typical modern appliances.

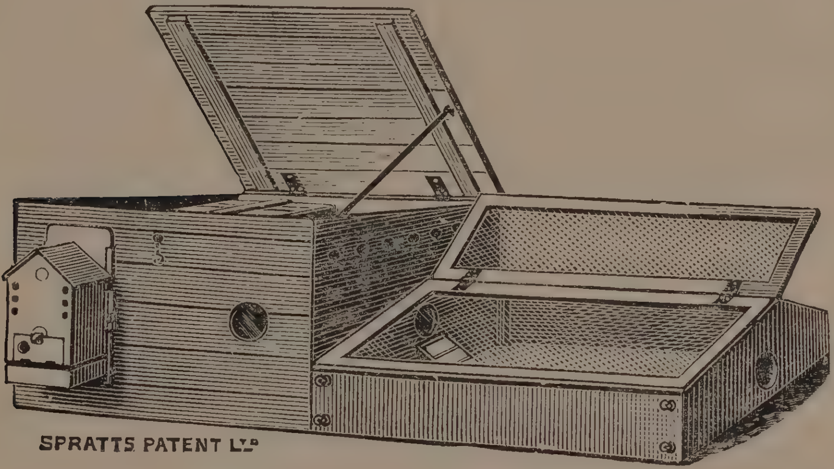


Fig. 27.—Hearson's Brooder.

Fig. 27 represents the general arrangements of Hearson's heated brooder, which has been designed to overcome the difficulty of regulating the heat in appliances heated by means of a fixed tank of hot water. In this brooder the heated air is carried from the lamp through the brooding chamber by means of an air-tight flue, and none of the products of combustion can gain access to the interior; the extent and arrangement of the flue tends to an even distribution of heat, and a chief point of the contrivance is that the position of the flue is adjustable, so that it may be lowered, in the case of young chicks, to a height immediately above their backs, and raised as they grow, or in the event of an increasing external temperature. An outer compartment is provided, being divided by a curtain or fringe of some warm material; and in the finished machine, in addition

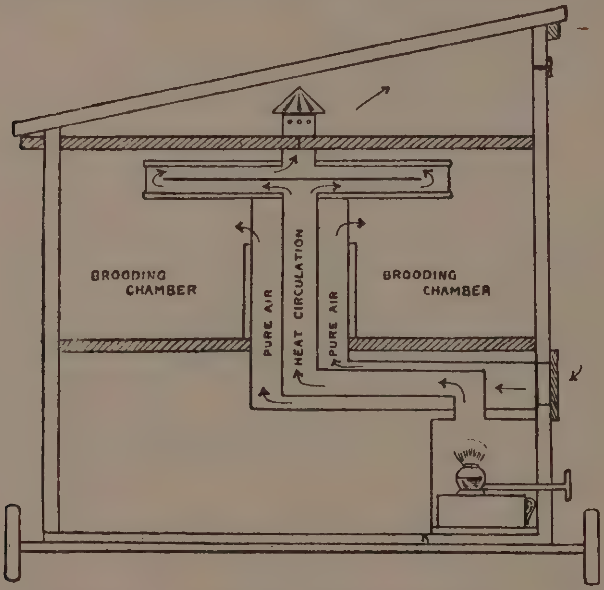


Fig. 28.—Sectional View of Tamlin's Hot-Air Brooder.

to one lid covering the whole, there is a separate cover to the warmed chamber, which serves to retain the warm air when the outer lid is opened.

In Fig. 28 may be seen the method employed in Tamlin's hot-air brooder, the principle of which is somewhat different from the foregoing, approximating rather to the style originated in America, but yet sufficiently distinct from both to represent another type. The heating flue extends from the lamp chamber, up through the of centre the brooder, to a circular radiator, which is divided by a horizontal plate, round which the heat generated by the lamp circulates, and finally emerges from the cowl at the top, into a separate section in the roof, and is dispersed through ventilating holes opening to the outer air—the direction of its course being indicated by arrows. The heating or radiating surface is considerable, and ventilation is secured by means of a constant supply of pure air drawn from the opening above the lamp, and this, following the course of the flue in a surrounding pipe or drum (but without any connection with it), is warmed before it enters the chicken chamber just below the tank radiator—the direction being again indicated by arrows. By this arrangement the isolation of the lamp and its fumes is secured in connection with a constant supply of pure but warmed air.

The next illustration (Fig. 29) depicts an American type, the Cyphers, and it must be explained that the floor of the chicken chamber (*l*) has been raised from its proper level (*h*) in order to show the heating drums, etc. In this appliance the lamp chamber below is separated from the brooder proper by means of a metal ceiling (in the frame *g*), above which is the wooden floor (*l*), with a sufficient intervening space to prevent the overheating of the latter. Between the ceiling and the floor is a fresh-air inlet pipe (*i*), extending from outside into the perforated drum (*j*), where the fresh air is heated and discharged through the wire gauze screen (*n*) under the heavily curtained hover or cover (*o*). Within the fresh-air drum is an air-tight radiating heat drum (*k*), heated direct from below through the chimney of the lamp or stove. By means of this combination there is secured a continual renewal of fresh warm air beneath the inner hover and the outer chicken chamber, without the detrimental presence of lamp fumes. As in the first mentioned, these other brooders contain a second compartment, access to which is gained through an opening guarded by a fringed curtain; and in the outer compartment the chickens may be confined when necessary, but must in any case pass through its modified temperature on their way to the outer open-air run.

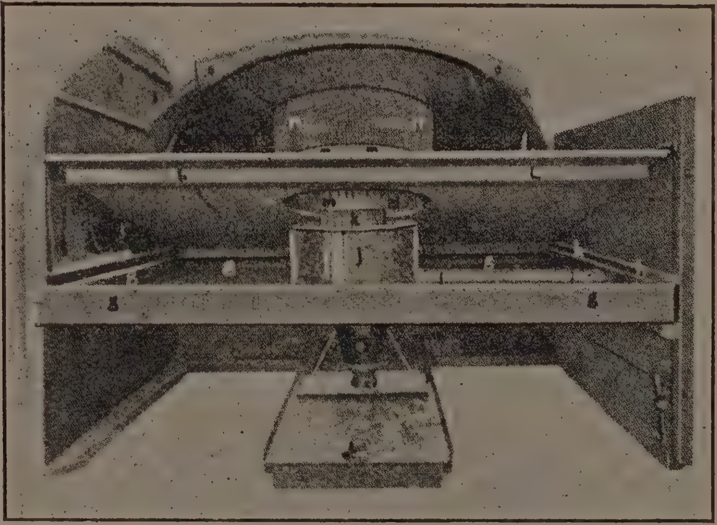


Fig. 29.—Showing the Interior Arrangement of Cyphers Brooder.

Fireless Brooders.

Although it is only recently, and chiefly in connection with American methods of intensive poultry-keeping, that rearing by means of fireless brooders, the principle is by no means new. Most henwives of the old school, who know and care nothing about modern artificial appliances, could relate experiences relative to the successful use of a basket and piece of flannel, whereby in an emergency orphaned chickens have been enabled to survive their chickenhood. Up and down the literature of poultry management there are many references to such contrivances, and in the first "Book of Poultry" directions are given in detail for the construction of what the author considered the simplest and best form of artificial mother. This was made with a box or box cover without a front, sloping from a height of 5 inches at the entrance to 3½ inches at the back. Holes were made in the sides and top for ventilation, and on the inside of the top there was tacked an ordinary sheepskin mat, fastened round the edges only, so that its own weight caused it to bulge a little downwards. The mat was chosen for length and softness of fleece, but a thick fleece was found to be objectionable, because the birds became entangled and suffocated. Within this foster-mother the chicks were found to keep themselves sufficiently warm, and the author (the late Mr. Lewis Wright), as the result of his own experience, recommended this form as "very useful for early broods"; but he was careful to suggest the desirability of confinement for some days in a small run, until the birds knew their artificial parent, and the subsequent necessity for feeding in the immediate neighbourhood. This difficulty of the early days of artificial brooding applies in some measure to almost any system, and all newly hatched chicks are liable to get lost when there is no hen to call them back. Nevertheless, it is perhaps accentuated in the case of a fireless brooder, and doubtless the birds return more readily to an appliance that is already heated; but the trouble may be minimized by early confinement to the adjoining run and feeding in close proximity to the artificial mother.

I do not, however, find that many of the earlier users of such prototypes of the more modern "fireless brooders" regarded them as anything more than convenient makeshifts, and the writer of the description upon which I have drawn qualifies his recommendation by the statement that he "would always prefer a good hen." Between that time and the present, or, say, during the last thirty or forty years, artificially heated brooding appliances have been developed to a remarkable extent, but the advocates of recent adaptations of the fireless principle assert that chicks grow stronger and quicker without the heating systems that have been gradually improved during the period that has intervened. Nevertheless, even the most enthusiastic are not entirely agreed, and Major-General Mansfield, who is a foremost exponent of the American method, concedes the possible advantage of supplied heat during the first few days, when brooding is undertaken in the depth of winter. Here, again, we may trace a return to earlier practices, in this case to the transition period. Some of those who used the sheepskin mat as a temporary expedient so far recognized its limitations as to superimpose a hot-water bottle wrapped in flannel, for use on cold nights; and some of the earliest heated brooders depended for their success upon slight improvements based upon that crude commencement of supplied heat.

The fireless brooder as very generally constructed to-day depends upon an arrangement of one or more "quilts" so adjusted that there is a depression in the centre, where the birds group instead of crowding into corners, the chicks being kept warm by contact and the conservation of the heat of their own bodies. The present enthusiasm for the system having reached this country from the United States, it may be noted that such a well-known American authority as Mr. John H. Robinson stated that "the fireless brooder, as developed to date, is not adapted to regular use on an extended scale"; and he added that in a heated room or brooder

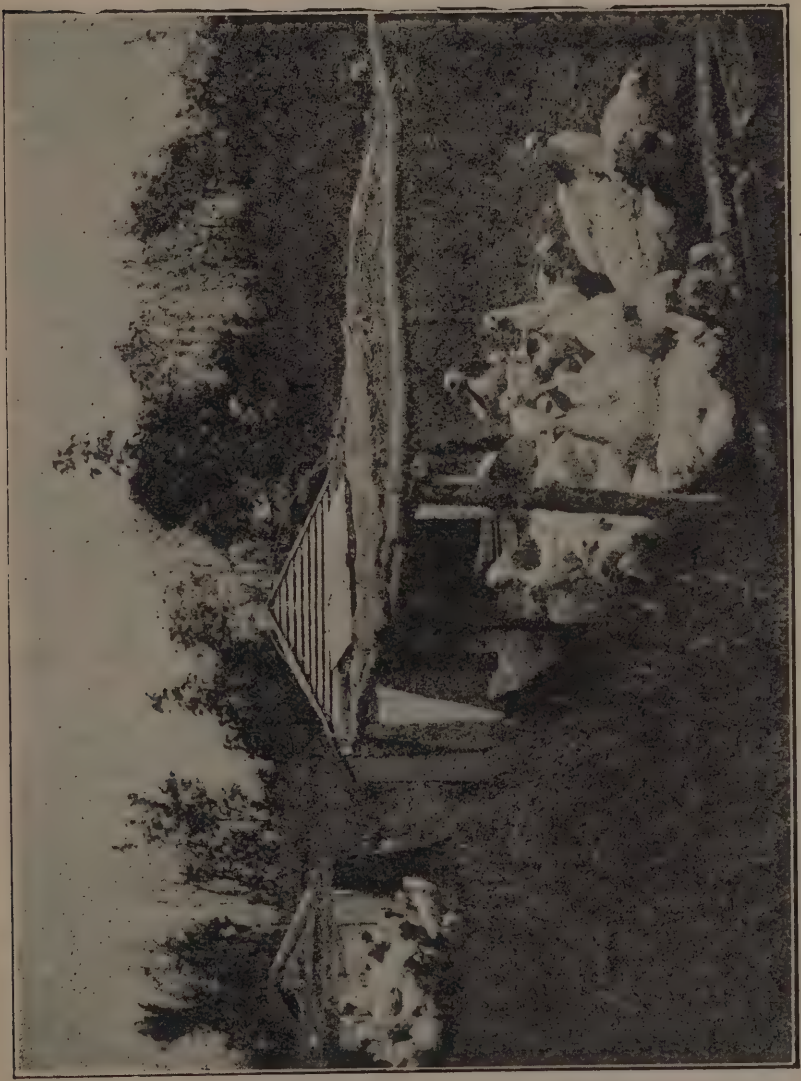


Fig. 30.—A Method of Rearing Chickens in Movable Pens.

Birds may be half fattened for market in this manner.

house, or elsewhere in moderate weather, these brooders may work very well, but the birds in them require close attention at first, and they are not adapted to low temperatures. That is the opinion of the editor of *Farm Poultry*, a writer who is well qualified to recognize the merits and demerits of a system that has been strenuously exploited in his own country; and his judgment has been practically confirmed by some rearers who have given the system a trial under English conditions.

Subject to the various modifications of different makers, the fireless brooder described and advocated by Major Mansfield is fairly typical of the principle of the appliances used in the American system and adapted to rearing in this country. It consists merely of a shallow box, some 8 inches high, with an opening at one end to serve as an entrance. The top is a movable frame for the support of a piece of muslin or thin sacking, so tacked to the frame that it sags about 2 inches in the centre. Three quilts, stuffed with cotton-wool about 1 inch thick, are made to cover the frame, all being used at first, but the number reduced as the chicks grow and require less brooding. The floor is covered with a damp-resisting material, such as roofing felt, and the bedding material (hay chaff) is pressed well into the corners, leaving a nest in the centre. Such a box is placed in a suitably constructed coop or shed. Some such contrivance may prove very useful in some circumstances, but it does not appear that the method is equally suitable at all seasons, or for general adoption in preference to the natural or other artificial means of brooding; and unless ventilation and cleanliness receive very particular attention, the requirements of hygiene would seem to suggest disadvantages.

CHAPTER

FEEDING AND FATTENING

Feeding stuffs—Preparing the food—The act of feeding—Mashes for laying hens—The moist and dry methods as applied to rearing—Fattening.

Feeding Stuffs.

It is a common fault of humanity to abandon one extreme for another, a character that is often exemplified in the conduct of poultry-keepers in the adoption and rejection of feeding systems that are from time to time promulgated by modern theorists. It is, however, the very general practice of the commercial producer to adopt and follow a line of his own, which is based upon a selection and rejection of the common feeding stuffs generally available, and there is a resultant final adhesion to such as practical experience proves to be best suited to the particular requirements. Amateurs and novices are, however, more or less open to conviction, and wish to purchase their feeding stuffs with a sufficient knowledge of composition and general suitability for the various purposes of feeding.

Such beginners in poultry-feeding require to possess a general acquaintance with the character of the digestible constituents of the foods commonly used, the value of a food for a given object being based upon the relative proportion of the nitrogenous to the non-nitrogenous substances of its composition. In the dry matter the former consists mainly of albuminoids, which go to make flesh and muscle, and are required for bodily construction, reconstruction, maintenance, and reproductive purposes; whilst the latter are chiefly composed of fats, or heat-producers, and carbohydrates, which supply heat and energy.

The too particular working of what is called the albuminoid ratio, which in plain English means the proportion of flesh-forming to fattening constituents, is quite unnecessary in ordinary circumstances; and the generality of poultry feeders have not the time for such calculations, even if they possess the mathematical facility; but it is necessary to have a working acquaintance with the feeding values of common feeding stuffs. For example, the following broad indications should suffice for general guidance: Relative to meals, the feeder should understand that Sussex ground oats make a well-balanced food for fattening, for the feeding of running chickens, and—within limits—for laying stock on a free range. Barley meal is a common adulterant of the foregoing, and is of itself a relatively useful fattening food, its other and sparing use being chiefly confined to fowls run on a large area.

Middlings and sharps (also described by other names), allowing for differences of quality, are a generally useful food, which enter largely into the composition of mash mixtures for the feeding of adult fowls. Good quality bran is in due proportion useful alike for inclusion in the dietary of forward chickens and fully grown stock.

Peameal and beanmeal possess flesh-forming properties, but must not be used too freely. Maizemeal is a fattening food, but is productive of a quality below the requirements of the best demand, although its sparing use in feeding fowls on an exposed range during the winter must not be overlooked.

Although wheat is a well-balanced grain food, experience suggests that its use should be limited to the extent of feeding it upon alternate days only, and preferably when fowls run free; when boiled, its occasional use for growing chickens is beneficial. Barley, when fed with moderation, is a good food for laying stock during cold weather—in some situations—but, except in small quantities, it is too heating for a very general use.

The use of maize should not be entirely neglected, as it has been by some extremists, because, although it is fattening when fed to excess, it has its undoubted uses for winter feeding.

The grain that may be freely used in almost all circumstances, and under varied climatic conditions, is the oat, of good quality and free from husk. The place of green food in the general dietary need scarcely be insisted upon.

Preparing the Food.

Vegetables, bones, table scraps, should all be adequately dealt with in the cooking department of the feeder's work; and if I have not mentioned meat hitherto, it is because of its more intimate connection with the stock-pot. Prepared meat of various descriptions, or green bone that has passed through the cutting-mill, are among the forms of "animal" food well known and freely used by a large class of feeders; but practical producers, who go to work economically upon a more or less extensive scale, preferably buy their meat in other forms and prepare it themselves. It is perhaps less convenient to do so, but profit does not always follow the adoption of easy methods.

Butcher's offal may not be so pleasant to handle and deal with, but it is a cheap or relatively cheap form of desirable food when cleaned and boiled.

Meat in the form of horse-flesh may, in some districts, be purchased at reasonable rates, but in some form meat or "animal" food is required for the promotion of growth and the maintenance of prolificness—particularly during the winter season, when it is essential to compensate in the feeding for the deficiencies of the insect food that is at other seasons more naturally available.

It is essential that some of the ingredients in the morning mash be properly steamed, and bran is a well-known example of this necessity, not only to lessen the tendency of the fibre to set up intestinal irritation, but also to enable the birds to obtain the full nutrient value.

The mere damping of bran in its mixture with other meals is quite insufficient, although it is commonly done in order to save time and trouble; but unless it is scalded thoroughly it is very wasteful, the scaly, sharp-edged pieces causing a more rapid evacuation of the whole of the but partly digested and absorbed food.

The different preparations of clover that so admirably enter into the composition of winter feeding mixtures, when the growing herbage is both scarce in quantity and poor in quality, also need careful scalding to make the use economical and prevent digestive disorders. Finally, the proper preparation involves some skill in the actual mixing of the ingredients, to the avoidance of a mealy, dusty dryness on the one hand, and a sloppy or sticky consistency on the other.

The Act of Feeding.

The manner in which feeding is actually performed may appear less important than it really is, relative to results. Nevertheless, not only do methods vary considerably, but so also do the effects. The quantity fed at any one meal is a factor that of itself influences the measure in which an end is attained, the too common tendency being to defeat that end by allowing too large a quantity of food, in addition to which the place and mere manner of feeding require very careful consideration.

The wide adoption of the scratching shed as a place, and the manner of feeding therein in litter, has materially increased the winter output of eggs; but it is as undesirable as it is unnecessary to commence the use of the scratching shed at the beginning of the laying season, and to continue it throughout. There are many autumn and winter days when outside feeding is preferable, the place being chosen and changed according to prevailing conditions.

Mashes for Laying Hens.

Mixtures of ground foods are very largely used in feeding laying stock, but the more general adoption of the intensive and semi-intensive systems of housing and management has resulted in modifications of the method of mash feeding. The term "mash" is generally understood to apply to a moist mixture of food ingredients, but the phrase "dry mash" is now commonly used to indicate very similar mixtures that are not moistened. Although the use of dry mixtures has found favour chiefly with those who keep laying stock under the more modern systems, opinions are divided regarding the comparative advantages and feeding value of wet and dry mashes. In America dry mashes are much more commonly used than on this side, and it is doubtful whether the method would have become so prominent in the United States but for the persistent advertising of trade mixtures. Indeed, M. John H. Robinson, of Massachusetts, a leading authority, has stated that, for several years after dry mashes began to be exploited in the poultry press, it was noticeable that those advocating their use and reporting results were, almost without exception, directly or indirectly interested in the sale either of dry mashes or of hoppers to contain them. The fact does not necessarily condemn the method, and, although it must be considered, it may be allowed that dry mash feeding appears to have certain advantages in some circumstances of poultry-keeping. Under certain conditions difficulties are experienced in using wet mashes, and many poultry-keepers are inclined to feed dry mashes on account of their greater convenience and the saving of labour in proportion. It is, of course, obvious that the dry mixture does not as quickly spoil or sour as that which is moistened; and when it is fed in hoppers of suitable size frequent replenishment is avoided. It should be, however, observed that, inasmuch as the dry mash is assumed to be practically the equivalent of a moist mixture, as regards the similarity of the ingredients, the birds still require to be supplied with hard grain food and fresh vegetables.

The South American Government expert, Mr. D. F. Laurie, who has such a considerable experience of the management of laying stock, states that, as regards egg production, hens fed on dry mash will not lay so well as those fed on wet mash, adding that they generally become too fat. But whilst that opinion is based upon his own experience, he freely admits that there are conditions in other countries that may justify the method and make profitable results possible. It would certainly seem that it is less risky for the inexperienced poultry-keeper to use dry mixtures rather than wet mash, because the latter offers greater scope for variation in composition and consistency. The amateur is rather inclined to include any and every sort of food in a moist mixture, and not uncommonly makes it either sloppy or doughy. In the result there is a frequent wide departure from an ideal balanced ration, and, in addition, the development of internal disorders is encouraged. A dry mash, on the other hand, is much more likely to be compounded with some approximation to an adopted formula, but in any case the other foods must be selected with reference to those used in the mash, in view of the costive property of ground grains in a dry state.

That there is considerable difference in the dry mashes used by those who have experimented in the method will be seen in the following examples: The Maine experiment station ration is compounded of wheat bran, two parts by weight; maizemeal, one part; flour, one part; gluten feed, one and a half parts; and meat scraps, one part. One of the Cornell rations consists of maizemeal, two parts by weight; wheat middlings, two parts; wheat bran, one part; beef scrap, two parts; and alfalfa meal, one part; whilst at the Ontario Agricultural College the most satisfactory dry mash is said to consist of nothing more than rolled oats. In a two weeks' test of the latter, it was found that the birds consumed more than twice the quantity by comparison with three other dry mashes —containing different mixtures of the more usual ingredients—that were placed before them at the same time.

The usual method of feeding dry mashes is to place the mixture in self-feeding hoppers, to which the birds are generally allowed free access at any time. They consequently eat slowly, the crop is not overloaded, and the digestive process is aided; but in some cases, where the possibility of overfeeding is suspected, the hoppers are closed during certain portions of the day. It is, however, contended, when dry mash is used as a supplementary feed, with a suitable supply of hard grain, that it is not sufficiently attractive in form to encourage overeating, but that the general food consumption of the flock is more equal. Any sufficient and satisfactory comparison of the value of wet and dry mashes is rendered difficult by the fact that experience tends to prove that, as regards egg production, either method may be superior in certain circumstances. The character of other food employed, the method of feeding it, and the housing conditions, must all be carefully considered as important influencing factors.

The Moist and Dry Methods as applied in Rearing.

The moist system is not altogether a satisfactory one, particularly in places which are low-lying and damp. One of the difficulties encountered in the rearing of chickens is diarrhœa. When employing the dry system this trouble is almost entirely overcome, whereas moist foods seem rather to encourage the complaint. If the greatest care is taken to see that the food is never supplied in a sloppy state, and that it is always freshly prepared, the danger is not very great; but when the work has to be left to a poultryman, one cannot be sure that the necessary precautions are always taken. Among other disadvantages connected with the moist method of feeding may be mentioned the labour involved in preparing the food during the first few weeks of the chickens' lives, as it is necessary to give it to them warm and freshly prepared every few hours. Moreover, difficulty is sometimes experienced in persuading the youngsters to take plenty of exercise, particularly when rearing in brooders, while mortality early in the season, especially in cold and damp places, ranges high. The moist method is rather expensive, as the various foods are by no means low in price when of good quality. Against these disadvantages must be put the greater rapidity with which the chickens develop, an extremely important point when they are being reared for table purposes. So far as breeding stock is concerned, however, this is not so important a matter, since stronger growth is of greater importance than rapid development.

The disadvantages are largely overcome by adopting the dry method of feeding, which consists in supplying to the chickens grains only during the first months of their lives. Up to the age of four weeks they receive nothing but a mixture of grains scattered in litter on the floor. This is really, in my opinion, where the system scores so heavily, because exercise maintains good health. Instead of the chickens standing idly about all day long, they are kept busily engaged, and very soon they come to appreciate the fact that if they do not work they have to go hungry. There can be no greater inducement to hard work than this. Only those who have actually tried this system can realize how great an amount of labour is saved. Whereas under the moist system a man could attend to, say, a thousand chickens, under the dry system he can in the same time look after treble the number.

There are many excellent dry grain mixtures on the market at the present time. Great care must be taken, however, to obtain a satisfactory sample, since some very poor mixtures are sometimes offered for sale. Dry food should be examined to see that it does not contain too much dust, while a sample with much grit should be avoided, since this means that one is paying in normal times at the rate of about twelve or fifteen shillings a hundredweight for material which can be bought anywhere for three or four shillings.

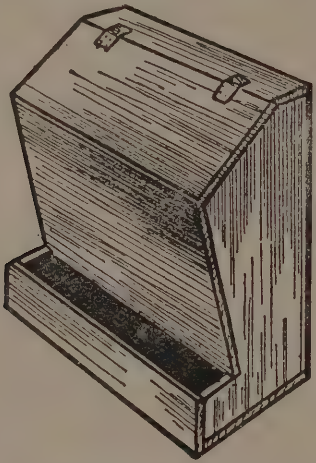


FIG. 31.—AN EASILY MADE FOOD HOPPER.

Fattening.

The age to which chickens should be run is determined by the fact as to whether the breeder is also the fattener, or whether his birds are to be sold to the higglers; if the latter, the chickens must be brought to higglers' size in about three to four months, and should then realize an average price of about 2s. 6d. The higgler wants "frame," not fat; it is his business to fatten, and most fatters prefer the birds lean, in which condition they take more readily to the fattening process.

Should the breeder, however, decide to fatten his own birds, and so secure the two profits, it will sometimes pay him better to let his chickens run more than the three or four months. In view of the fact that size tells in the market, the birds for home fattening should run until they are big—say five or six months old, according to individual rate of development; and if they are then shut up to fatten, they may, if necessary, be sufficiently fattened without the use of the cramming machine, because, having made their frame when still running, the food they peck (when shut up) goes to fatten them, whereas the fattener buying his birds young is compelled to cram for the reason that all the food such young birds peck goes to increase frame and size, and if they were not crammed they would simply grow and not fatten. The chief factor, however, to be considered, in coming to a decision as to whether one will sell to higglers or be both breeder and fattener, is the distance from market, and the facilities at hand for transmitting the produce.

As regards the method of fattening, no system has proved to be equal to that so long and so successfully followed in Sussex, whose fatted chickens always obtain top prices in the market; indeed, even our "hustling" cousins in America (who have taught us much about poultry) have taken lessons in chicken fatting from that anything but hustling Sussex.

The fattening coops are usually placed in the open, with some kind of wind screen running along the backs, and sheets of corrugated iron on top to keep off the rain. But a much better plan is to erect long sheds with corrugated iron roofs and with sides made of faggots, which make the feeding easier in winter and bad weather, and the faggot walls allow plenty of ventilation without direct draught (or should do so if properly made). Wooden

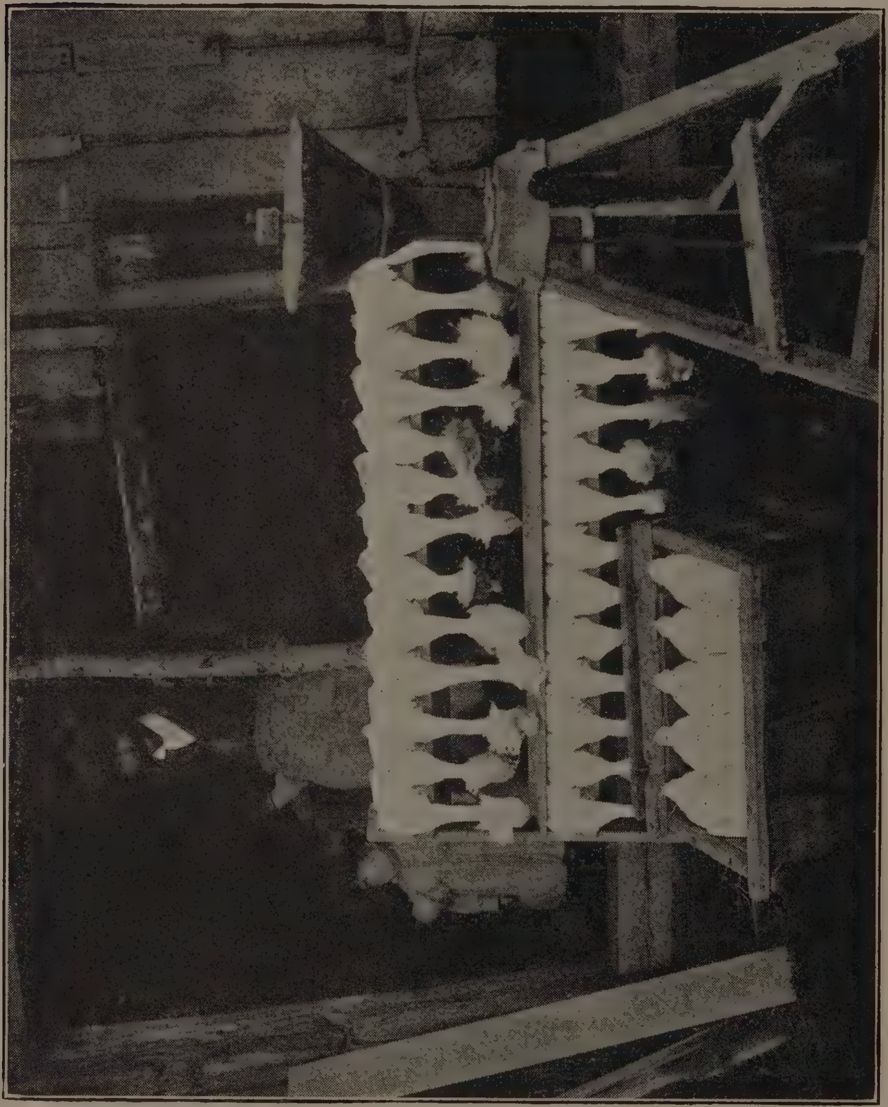


Fig. 32.—The Fattener's Appliances, showing Cramming Machine, Chicken Press, and the Method of Packing for Market.

V-shaped troughs must be made to take on and off from the front of the coops.

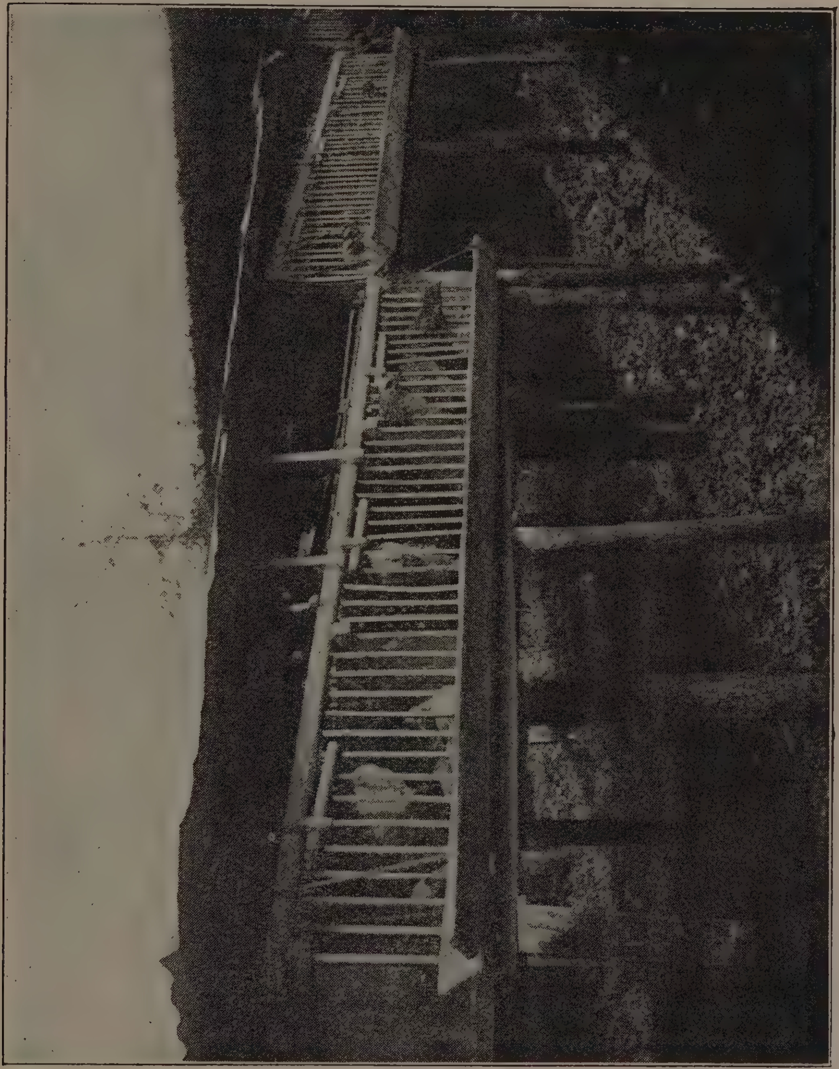


Fig. 33.—Fattening Pens in the Open, protected with a Roofing of Corrugated Galvanized Sheeting.

When first put up, allow the birds to get hungry before giving the first food, and then feed them morning and evening in the troughs, giving as much as they will peck, taking away the troughs when they have finished. The trough food should consist of Sussex ground oats, fat, and milk, mixed to the consistency of a gruel.

If cleanliness is essential in successful breeding and rearing, it is, if possible, more absolutely necessary in a fatting establishment, especially if the fatter buys other people's birds; the droppings (which are so valuable a manure) must be frequently and regularly removed, and should be stored under cover until carted out on the land. This manure store should be removed as far as possible from the dwelling-house. It is a significant fact that during a diphtheria epidemic in East Sussex the families of chicken fatters suffered severely, and the medical faculty then pointed out the danger of the common practice of placing large heaps of poultry manure so near the house.

Disinfectants should be freely used. Troughs must be constantly scalded, and fatting coops and sheds frequently limewashed with hot limewash. These are important details which, as experience has taught, cannot be too strongly insisted upon.

If the breeder is also a fatter, it is of the utmost importance that the fatting establishment should be entirely separate and removed from the breeding and rearing grounds; running fowls should never be allowed, as is too often the case, to roam at will around the fatting coops, where they are especially liable to contract disease from the more or less foul nature of the surrounding ground. Neither is it advisable for the birds undergoing fatting to be able to see other birds at liberty—it makes them restless; whereas quiet surroundings and a state of content not only help, but are necessary to the fatting process. Although all birds do not fatten in the same time, as a general rule the period is about a fortnight of trough feeding and a week of cramming.

Cramming.

The cramming process does not need much explanation, as in these days very few would find time for hand cramming; and the machine is easy to work, a few practical lessons being necessary to enable the operator to judge the exact amount which a fowl's crop will hold without the danger of bursting. Let me again insist upon the necessity for cleanliness: the cramming machine must be kept clean and sweet.

CHAPTER XI

MISCELLANEOUS

Co-operation—Industrial organisation needed—Egg and poultry societies—The preservation of eggs—The value of poultry manure—Conclusions.

Co-operation.

In the foregoing consideration of the general scheme of production, the subject has been broadly treated from the point of view of the individual producer, his requirements and opportunities. It is, however, advisable to make some brief reference to co-operation and its advantages in connection with such work as poultry farming. The application of this principle is at present comparatively limited, but that it will be more widely adopted in the future is extremely probable. Under the prevailing conditions it is open to the beginner to commence operations within the radius covered by an existing egg and poultry society, or to endeavour to form such a body in any other suitable locality of his choice.

At the present time, with but few exceptions, the co-operative collecting depots devote their energies to the marketing of eggs; but, with the growing activity in table poultry producing circles, some greater attention to this branch of work is to be anticipated. Perhaps the greatest difficulty to be overcome is that of finding a remunerative outlet for unfattened chickens. The solution of this problem would seem to involve the establishment of fattening centres, and this can only be done by a very carefully worked scheme of organization, including the education of producers to issue an adequate supply of suitable birds in a sufficient succession to maintain the regularity of output. Although this is perhaps very much in the future, it is a subject for the ever-present consideration of all concerned—without which no progress will be made.

But the advantage of co-operative marketing for egg producers is an established fact which needs little insistence here. Nevertheless there are circumstances in which the producer may very successfully manage his own affairs, and it rests with the individual to consider carefully the conditions of his own case in this connection before he adopts a definite line of action.

Industrial Organization Needed.

The egg trade in this country is a big one in which large interests are involved, and in which British eggs do not enjoy any very considerable reputation. The value of our annual imports is sufficiently indicative of the very large turnover and importance of the trade. It consequently follows that it is hopelessly futile to attempt to enter this business, with its keen competition, in an amateurish manner. The possibilities of production are being persistently and insistently demonstrated, and enthusiasts ceaselessly proclaim the advantages of co-operation; but to make this properly effective the trading side must be in the hands of, or controlled by, level-headed business men. It is questionable whether associations of producers will be able unaided to find the way out, or whether it would be wise for the authorities to give assistance—and, if so, to what extent and in what manner—but there is scarcely room to doubt the necessity for some modification of the existing arrangements. At present individual producers not infrequently find a better market for themselves than is afforded by the co-operative outlet, and as a result the societies find their supplies short when prices are up, and long when values are down. There is, moreover, very frequently an undesirable and unavoidable competition between the different bodies of producers concerned, and federative efforts are not encouraging. All this may smack of pessimism, but it is necessary to face the fact that the co-operative theory is not working out as well in practice as its friends could wish, and it is in the best interests of the industry that weaknesses should be located and strengthened. This is more especially necessary at a time when there is some prospect and promise of development on the productive side. The need of a strong business side was probably never greater than it is now.

The marketing of table poultry has not been attempted upon the same lines, except in a very small and tentative way, but some revision of the methods commonly employed is equally desirable in this branch. Apart from the gradually developed and purely commercial organization which has grown up in connection with the localized chicken industry of the south-eastern counties, there is no effective combination of table poultry producers. Those other innumerable rearers and fatteners who are scattered throughout the country are at a considerable disadvantage on account of their isolation, and the consequent necessity for individual marketing in relatively small quantities at irregular intervals. The marketing of the south-eastern fattener is, of course, individual, but it is regular and the consignments are bulked for purposes of transit. They in common with others are very largely in the hands of the salesmen, but their position is stronger on account of the informal combination that attaches to the concentration of a large number of specialist producers within a somewhat circumscribed area. They have also their own protection association, but it is rather to their common interest and daily intercourse that they owe such control of the situation as is theirs.

If small holders and others are to be further encouraged to increase output, whether of eggs or poultry, a responsibility is created, and the systems of marketing should be made the subject of thorough investigation; and if co-operation is to be advocated, success will depend upon the business efficiency of the executive in every case.

Egg and Poultry Societies.

There are several ways in which the unorganized producers of a given locality may combine for the benefit of all. The suggested methods of combination are sufficiently elastic to meet the needs of different districts, and it is evident that varied circumstances make it impossible to mould all in the same shape. The exact form of association must necessarily depend upon the local conditions and opportunities, and, whilst in most cases there is room for improvement in methods, it is obvious that where the local demand is greater than the supply, as in manufacturing and residential districts, there is no necessity for the establishment of a depot.

The most elementary form of co-operation is the egg-collecting club, and the Board of Agriculture and Fisheries recommend the formation of a club of this description in a district where supplies must be sent to a near-at-hand market town, but where the producers are too few for the formation of a regular co-operative society. The arrangement is simply one between neighbouring farmers and cottagers, whereby one undertakes to receive, pack, and forward, the produce. By this method the bulk may be handled more remuneratively than the small individual lots, and the arrangement provides for the periodical division of the returns among the contributing producers in proportion to the number, or preferably the weight, of eggs supplied by each, less a small percentage retained by the marketing member. The method is one that may advantageously be adopted by groups of allotment or small holders, who would thus benefit to the extent of the profit that is frequently in such cases made by the higgler. The formation of local utility poultry clubs, that was recently suggested, would open the way for the co-operative purchase of feeding stuffs, but as a preliminary the egg clubs would do much to teach the advantages of combination.

The existence of an agricultural or industrial co-operative society will in some districts obviate the necessity for the formation of a separate association, and such bodies have already included eggs within the scope of their operations. Where these societies are centred in small country towns, there must frequently exist very favourable opportunities for dealing with the eggs produced on the farms or holdings of the members without any very material charge for handling, inasmuch as the necessary organization and the facilities for transport are already in existence, and may be utilized without any great addition to present cost of management. The suggestion that such an addition would necessitate the employment of a man capable of dealing efficiently with such produce—and I was met with this objection at Carmarthen a few years ago—would obviously depend upon circumstances and the extent and growth of this branch of the trade. But the success attained by societies specially formed for the purpose of collecting and marketing eggs alone, despite the fact that they must bear all the expenses incidental to the conduct of a depot, would seem to suggest that the difficulty is perhaps more imaginary than real in cases where the general expenses are shared with the other operations of the association.

There are, however, needs that cannot be met by the formation of a simple form of club, and these frequently exist where there is no agricultural or industrial co-operative society, or where such latter body objects to the inclusion of eggs within the scope of its activities. In such circumstances it is desirable to form a regular co-operative egg and poultry society, with a depot for the collection and despatch of produce. Where the production already exists, or is capable of easy development, in any considerable measure of excess relative to the local requirements, the experience of the last few years has shown the remunerative possibilities of such societies. There is evidence to prove that under capable management the members may obtain prices averaging about 2d. per dozen more than they would otherwise secure, and that apart from the profits made by the societies.

The Agricultural Organization Society states that the experience of existing depots shows that the percentage of capital to annual turnover required varies from 4½ per cent. to 13 per cent., according to the amount of business and the method of payment; and it is estimated that a chicken-fattening station would require from three to four times the capital of an egg depot, the capital being raised by shares of the value of 5s. to £1 each. The profits are divided among the producers in proportion to their supplies, after the payment of expenses and not more than 5 per cent. interest on the capital. Draft rules are supplied by the secretary of the Agricultural Organization Society.

The equipment of a depot includes a dark room and egg-testing apparatus, a receiving and packing room, crates and storage for empties, and the necessary books. A depot that will very well serve the purpose of a commencing society may be made by the adaptation, without much labour or expense, of an old railway carriage or van. This has been successfully done at Stoke Ferry, the converted carriage standing in the station yard, suitably situated for the despatch of the produce, and also for its delivery by the producers.

It is by such means that direct practical effect may be given to the teaching of an egg and poultry demonstration train, and small producers enabled to take fuller advantage of the opportunities of their situation relative to markets.

The Preservation of Eggs.

It has been proved by careful experiment that, properly preserved, eggs may be kept successfully for much longer periods than the average six months of ordinary requirements. In the report of a series of tests carried out at the Aberdeen and North of Scotland College of Agriculture, it is recorded that eggs were kept without taint for as long as four years, and that at the end of twelve months no important change in composition was found, while in taste and smell the preserved eggs could hardly be distinguished from ordinary fresh eggs. Failures to keep eggs in good condition for the more normal period of about six months are consequently due to a lack of appreciation of the factors essential to success.

It has been brought to my notice that, in several instances of failure, water from unsatisfactory sources of supply has been used in making the solution in which the eggs were immersed; and although in the preparation of a water-glass solution boiling water should properly be used, thus reducing the risks, there are many cases in which the strength of the solution is not the best for the purpose. Assuming the use of pure boiling water in the preparation of the preservative, and the mixing with the water-glass sufficiently in advance to allow the solution to become quite cold before the eggs are immersed, the results may still be unsatisfactory if the proportions are excessive in either direction. The strength of the concentrated solutions sold for the purpose varies, but should in every case be ascertained before diluting with a further bulk of water in preparation for use. Directions for dilution differ to some extent, and it is probable that in very many instances the proportion of water-glass actually used is greater than is necessary or really desirable. A 10 per cent. solution is very commonly recommended, but a solution of half that strength would be preferable, and it has been experimentally shown that as low a proportion of water-glass as three parts to ninety-seven parts of water is all that is required to give good results.

When lime-water is used, as it generally is where many eggs are dealt with, being cheaper, the making of the pickle should be commenced about a week before it will be wanted for use. Four parts of well-slaked lime should be mixed with twenty parts of cold, pure water, and, after stirring daily for a week (adding one part of salt in the middle of that period), the clear solution should be poured into the preserving tanks or vessels.

Solutions of lime or silicate of soda (water-glass), prepared as suggested, should be about equally suitable, provided the other conditions are right. Of these it is very important to remember the influence of temperature; if this is too high, no preservative will avail to keep the eggs in good and sound condition. A failure to appreciate this fact is, doubtless, responsible for a good deal of deterioration in the quality of eggs that would otherwise be satisfactorily preserved. It is consequently necessary to set the preserving vessels in a place where the temperature will not fall below 33° F. or rise above 45° F. If there is no suitable basement or cellar, or other place of sufficiently even temperature, it is better to abandon the idea of egg preservation than to attempt it under unfavourable conditions. There is, moreover, another connection in which temperature must be considered—viz., relative to the months in which the eggs may be put into the preservative with the greatest likelihood of success.

The months during which it is usually considered most economical to put eggs into a preservative are March, April, May, and June, and in this country the period covered is generally favourable as regards temperature, the heat being seldom sufficient to affect the keeping properties of the eggs—as it is found to be at a later period. Scientific investigation has gone to show that during July, August, and September, the eggs have not the same keeping quality. However suitable the mixture, and however favourable the surrounding conditions, it has been demonstrated that eggs laid in the earlier months are, for this purpose, preferable to those produced in the warmer season. This suggests other particulars in which the careful selection of the eggs has an important bearing upon the result.

Not only should the eggs be put into the preservative at a time when their keeping quality is found to be at its highest, which, it fortunately happens, is the season in which egg-pickling is most economical, but they should be immersed in the solution on the day of production—although not when they are warm from the nest. There is obviously no need to test eggs of known origin; but if any are bought cheaply for the purpose, it is essential to "candle" them before they are preserved. Again, infertile eggs keep better than those containing living germs, and the latter would be more inimically influenced by exposure to an undesirably high temperature; while eggs produced by free-running, grain-fed fowls are considered to be the most desirable.

The Value of Poultry Manure.

The value of the manurial product is generally underestimated, and often entirely ignored, whereas it is capable of becoming an important source of profit under common-sense management. As a rule there is a considerable waste of manure, and even when its fertilizing properties are fully realized by the poultry-keeper, he can seldom find a sufficiently remunerative outlet for it as a marketable product. In the great majority of cases it is only possible to secure its proper value by making direct use of it upon the holding where it is produced.

Consequently the poultry-keeper who produces upon a commercial scale must also be a cultivator. The poultry-keeping farmer is, perhaps, using the manurial product to the greatest advantage in the circumstances when he adopts the colony system, and thus insures a fairly even and wide distribution. But on account of this very breadth of distribution, and the probable fewness of the fowls in proportion to the acreage, the benefit is not so obvious as when a bigger head of stock is kept on a small area, and methods of greater control must perforce be adopted. Nevertheless, it is only a question of degree; the value of the manure bears the same relation to the value of the food consumed in the one case as in the other.

According to the recognized method of valuing, poultry manure is estimated to be worth from two to four guineas a ton, the difference in the value of given samples depending upon the moisture content as well as the character of the feeding. Whilst it is evident that a higher value would attach to the manure collected from beneath fattening coops, that ordinarily produced is, in the words of Dr. Voelcker (as quoted in Wright's "Book of Poultry"), "a much more concentrated fertilizer than the best description of ordinary farmyard manure." Its value in cultivation necessarily depends largely upon its condition at the time of application; but although that which is collected from fattening sheds or from dropping boards may be specially stored and treated, the greater part of this product goes direct on to the land. It is consequently argued by Mr. Paynter (who conducted the chicken-rearing experiment at Haslington, near Crewe) that its value should be reckoned upon the recognized basis that holds good in making an ordinary farm profit and loss account—viz., relative to the value of the food consumed. In this connection it is of interest to note that, in a report of the Royal Commission on Agriculture (published in 1895), Mr. R. H. Rew drew attention to the hardship imposed upon large poultry feeders in respect of the non-payment of compensation to an outgoing tenant for the purchased corn, compensation being payable for that consumed by cattle, sheep, and pigs. He mentioned one case in which £850 per annum was spent on corn for poultry, in addition to the £150 worth of home-grown corn. It is very justly contended that compensation ought to be allowed for the unexhausted manurial value of the whole of this left by a tenant on quitting his holding. Mr. Rew's comment was: "In any amendment of the Agricultural Holdings Act, the claims of poultry to be included ought not, I venture to think, to be overlooked."

However, apart from the question of compensation, the fact remains that the poultry-keeping cultivator of the soil possesses a valuable asset in the manurial product, and one with which the poultry account should be duly credited. There are many agriculturists who, if they keep poultry accounts at all, do not charge their fowls in respect of rent. This is because the manure is considered as an equivalent; but such a rough-and-ready method cannot justly be adopted in the case of the small holder, who includes poultry in his system of rotation. It is estimated by Mr. Paynter that, under his suggested scheme of 12-acre holdings, with an annual output of 4,000 chickens, the value of the manurial product (reckoned on the basis of the food value) would work out at about £11 per acre. He further suggests that the plots unoccupied by chickens, but manured by them, should be capable of producing a gross income of up to £200 from the crops grown on them. Whether this estimate be accepted or not—and it would certainly require to be practically tested—it must be admitted that the value of the manure produced under such a method of commercial chicken-growing cannot be calculated as a set-off against rent alone. Mr. Paynter apparently has in mind the growth of clovers, vegetable crops, etc.; but the system adopted and the returns would, of course, vary with the circumstances. On the Continent fowls are being systematically kept by some of the growers of sugar-beet, whilst they occupy a recognized position in many vineyards. In this country poultry-keeping is being developed by at least one large firm of fruit-growers. At Histon, near Cambridge, Messrs. Chivers and Sons have nearly a thousand acres of land under fruit, the same land recently also carrying upwards of 3,000 hens, the birds effectively keeping down injurious forms of parasitic life, in addition to providing a valuable fertilizer and producing eggs that are utilized in the firm's factories. The value of fowls in relation to the cultivation of fruit is also being increasingly recognized by colonial growers. In Nova Scotia, for example, where apples are so extensively grown for shipment, poultry are commonly found on the farms. It has been estimated by practical growers that fifty hens will furnish all the fertilizers that an acre of orchard requires. One grower in the Cornwallis Valley states that in an orchard of one hundred trees no other fertilizer has been used for five years; the trees are in a healthy and vigorous condition, and the apple crop sells for £200 a year. There is, in fact, a growing disposition to consider poultry and egg production in connection with the cultivation of the land,

and to give the fowls a recognized position in the scheme of things, and there can be no doubt that poultry farming on such lines is profitable. It is consequently desirable that the connection between poultry-keeping and cultivation should be authoritatively demonstrated, rather than that efforts should be made to prove the profitableness of commercial egg and chicken production without concurrently showing the value that lies in the manurial product.

Conclusions.

I do not think that the prospects of economic egg and poultry production, in the several branches I have indicated, have ever been more hopeful than they are now. We have succeeded to a great extent in divesting the subject of nonsensical theories, and although many unsuitable persons continue to turn their attention to poultry farming as an *easy* means of earning a comfortable living, the majority of journals and responsible journalists offer no encouragement to such. It has, moreover, very generally been realized, by others who are more or less interested in the industry, that business is not helped in the long-run by exaggerative accounts of supposed possibilities; consequent failures are less common than was formerly the case, and confidence in this branch of rural occupations is correspondingly increased.

I have throughout my notes in the present connection purposely avoided any estimate of probable returns, because it is my experience that suggested financial results are generally misleading. But if the work is undertaken upon common-sense lines, and not divorced from all other possible uses of the land or suitable concurrent occupations, I have no hesitation in saying that it may be reasonably profitable. It may, indeed, be made the most remunerative source of income in suitable circumstances, a fact that is fully supported by many instances of financial success within the range of my own personal knowledge.

Although I could produce much evidence of this description, I must once again insist upon the fact that I have striven to impress throughout, and that is that utility poultry farming is essentially a branch of agriculture, and of such a nature that it cannot safely be advocated as a sole means of livelihood. Its possibilities as a *part* are considerable, but when it is sought to treat it as a *whole* the conditions are at once altered, and the prospects are inimically affected.

It may be treated as the most important department of the work if you will, but cannot successfully be made to stand alone and apart from the other interests that touch it at so many points, and to neglect which is at once an indication of ignorance, and a direct courting of failure. It must be remembered that the unit dealt with is so small that the return is inadequate without a sufficient increase of acreage to allow for the proper accommodation of the required multiplication, and the area that is needed for the purpose necessitates all that is implied in husbandry. Moreover, the profit upon poultry production, when conducted upon a more or less commercial basis, cannot be calculated from the returns obtainable from a few fowls, being in some measure in inverse ratio to their multiplication.

Finally, business knowledge is essential to success, and especially relative to the seasons that are most remunerative as regards the various descriptions of produce. It is required to strike the successive seasonable markets on the rise, the margin of profit largely depending upon the proportion of the production that is sold at the highest seasonable prices. The extent of the failure to meet the successive particular demands is the measure of the opportunity afforded foreign competitors, of whose produce and methods of marketing some study should be made by English poultry farmers.

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